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Deutsches Institut
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Data Documentation 5

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Rudolf Zwiener with the collaboration of Serhiy Yahnych

Modelling European Business Cycles (EBC Model)

A macroeconometric model of Germany*

* The public sector of the model is separately documented.

IMPRESSUM

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Version March 2005

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I. General Structure

- work started in 2001 with a modelling team at the department of macro analysis and forecasting
- co-operation with Prof. Jürgen Wolters at the Free University of Berlin
- financial support of the Ministry of Finance, Berlin

Focus of the model

- Short- to medium-term forecasts of macroeconomic development in Germany and major European countries
- Analysis of different macroeconomic policies

Theory versus data based model

- The model is data based, but specification is guided by economic theory
- No calibration
- Time series analysis and specification of error correction models (ECM)
- Economic theory is important to specify the co-integration relationships
- Common underlying structure estimated across all economies
- Same equations are used for forecasts and for economic policy simulations
- No restrictions with regard to homogeneity

Single country versus multi country approach

- Main focus on Germany (47 stochastic equations)
- Second focus on larger EU (EMU) countries (France, Italy, Spain, (UK)) and the Netherlands (10-15 stochastic equations for each country)
- Other EMU-countries are treated as one zone (10-15 stochastic equations)
- EU (EMU) aggregates are calculated by identities
- Later on USA are modelled separately
- Non-EU (and non-US) growth and price indicators for different regions are exogenous
- Linkages via imports and exports, exchange rates and interest rates, export and import prices

Special modelling strategies

- Trade is regionally disaggregated at most into trade with EU (EMU) countries and with non-EU countries. For Germany and Spain the regional disaggregation is much more detailed.
- Until now only adaptive expectations, backward looking, are used.
- Error correction framework is used to distinguish between short term dynamics and the long run solution equilibrium i.s.v. steady state
- Feedback rules to stabilise the model results: Unemployment, capacity utilisation, interest rates, unit labour costs, real effective exchange rates, wealth (savings), (public deficit ratio)

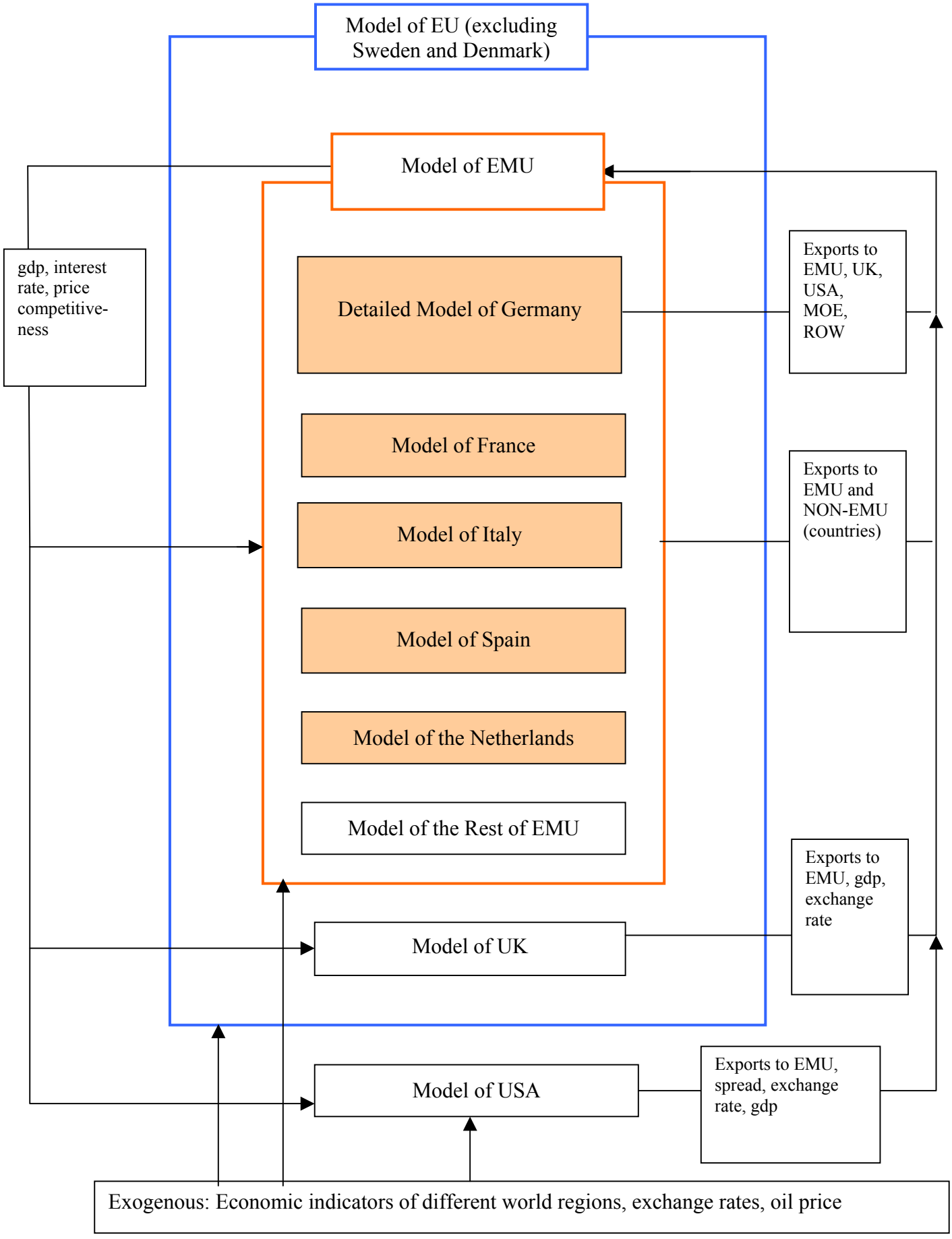
Theoretical base

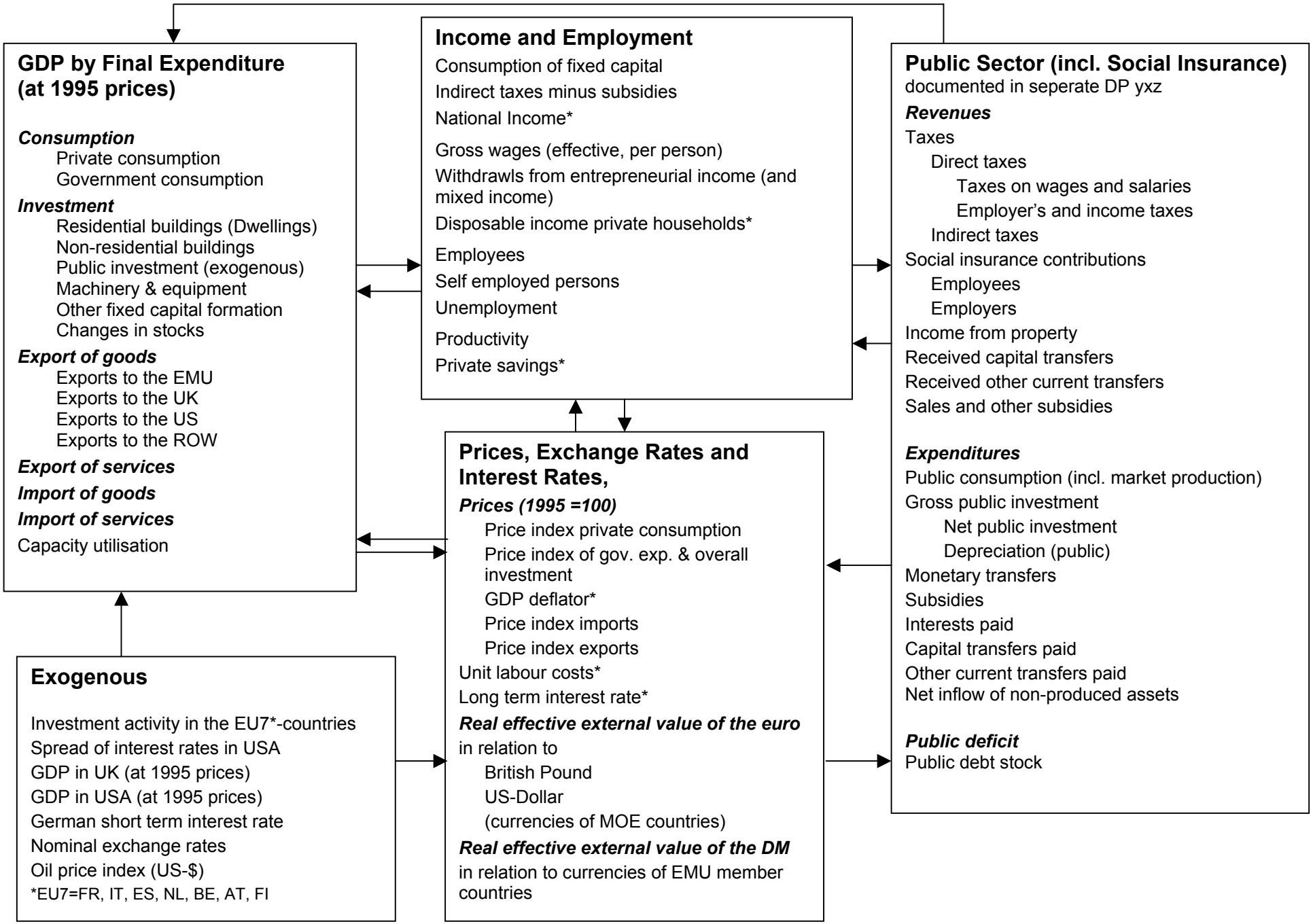
- Existence of nominal rigidities
- Real effects of economic policy
- Market spillovers
- Possibility of unemployment in the long run
- Difference between short- and long-term impacts of explanatory variables

Methodological base

- Analysis of the properties of the time series
- Estimation of error correction models
- Tests of the forecast performance quality of the stochastic equations
- Tests of autocorrelation of the residuals and stability of the coefficients
- Tests of ex post simulation of each equation in the context of the model complete equation inside the model

A.1. European Business Cycle Model





A.2. Structural Macroeconometric Model of Germany

II. Econometric Methods

Most economic time series are non-stationary and it is generally agreed that they follow a stochastic trend. They are characterized by asymptotically infinite variance and autocorrelations which imply that a shock has a permanent effect on the series and thus the series tends to "wander" away from a deterministic path without a tendency to return.

Cointegration means that two or more series „wander together". While each of the series is influenced by the permanent effects of shocks, there exists a long-run steady state relationship between them and a mechanism that forces them back to this equilibrium.

Technically speaking, two or more series are cointegrated if they are integrated of degree I(d) and there exists a linear combination of them that is I(d-b). In the bivariate case with d=b=1 that means if there are two economic time series Y_t and X_t that are I(1) and there is a relationship $Y_t - a*X_t = Z_t$ that is I(0), they are cointegrated with cointegrating vector [1-a] and Z_t is called the equilibrium error.

The concept of cointegration has become central in econometric time series analysis. One reason is that the equilibrium concept implied closely relates to the theoretical equilibrium view of the economy. Since most economic time series are taken to be I(1) theoretically established equilibrium relations between these imply a cointegrating relationship if the theory is indeed empirically valid. Non-cointegration would lead to I(1) error terms Z_t. And this basically means that no equilibrium exists since the errors are permanently deviating from zero.

Econometrically speaking, the analysis of the relationship between two or more cointegrated I(1) time series can be performed in an error correction framework. This approach is a re-parametrization of an autoregressive distributed-lag equation that explicitly takes into account the long-run equilibrium relation as well as the short-term dynamics of the series.
An error correction model (ECM) for Y_t as endogenous and X_t as exogenous series can be written as follows:

$$\Delta(Y_t) = \delta + \gamma \underbrace{\left[Y_{t-1} - \det - a * X_{t-1}\right]}_{\text{error correction term}} + \underbrace{\sum_{i=1}^{p} \alpha_i * \Delta(Y_{t-i}) + \sum_{j=1}^{q} \beta_j * \Delta(X_{t-j})}_{\text{short-term dynamics}} + \varepsilon_t$$

Δ difference operator
det deterministic components (constant, trend, seasonal dummies etc.)
δ constant
γ speed of adjustment parameter, $\gamma < 0$
ε_t white noise error term

The change in Y is influenced by last period's deviation from the equilibrium relationship between the two economic time series and lagged difference terms of the endogenous and exogenous variables. The number of lagged difference terms is chosen as to make the error

term white noise. One can see that OLS provides consistent parameter estimates as all elements are I(0) by definition if the two I(1) variables are cointegrated.

The following methodology was employed to construct the model:

1. relationship(s) for the variables under consideration were taken from economic theory
2. the time series properties of the endogenous and explanatory series were tested; all series had to be I(1) for cointegration relationships with I(0) equilibrium errors to be feasible
3. (several) cointegrating equations for the variables were tested
4. the empirically verified equilibrium relationship was used to construct an ECM
5. a (second) cointegration test was performed in estimating the ECM
6. the stability and forecasting properties of the ECM were tested, if necessary a respecification was performed
7. the performance of each ECM in the complete system was analyzed, if necessary a respecification was performed

There are several possibilities to test for (co-)integration. To check the time series properties the Augmented Dickey Fuller (ADF) Test was used, the results are shown in the documentation chapter III B. For step 3 of the analysis either the Granger methodology (Engle/Granger 1987) or the Johansen procedure was employed. This is not shown in the documentation as cointegration can also be verified in the final ECM used in the model (step 5).

This kind of test was proposed by Banerjee et al. (1992) and it makes use of the t-statistic of the speed of adjustment parameter. The argument from above that each element in the ECM has to be I(0) if Y and X are cointegrated can be turned around: if all elements in the ECM are I(0) than Y and X must be cointegrated. Then if X is exogenous γ must be significant for the adjustment to equilibrium to take place. Thus the Null Hypothesis of non-cointegration implies $\gamma = 0$. The critical values are taken from Banerjee et al. (1992). The significance of γ is shown in each of the equations.

Furthermore a battery of specification tests were performed (Serial Correlation LM Test, White's Heteroscedasticity Test, ARCH LM Test, Normality Test and Ramsey's Reset Test) as well as a stability analysis (Cusum, Cusum squared) and a detailed forecast evaluation. For the most important equations a single equation simulation was also added to analyze the effect of shocks to the explanatory variables.

After an equation for each endogenous variable was satisfactorily specified the definition equations were added and all equations were put together to form the model. Again each equations was analyzed, now with regard to its performance in the complete model.

Data base

Raw (seasonally unadjusted) quarterly time series data is used whenever available. The estimation period is from 1980:1 to 2003:4 for most equations. Time series for the public sector start in 1991:1 due to German reunification. National accounts data is taken from Eurostat.

Stochastic Equations

A. National Accounts Statistics: GDP by Final Expenditure

A.1. Private Consumption

Private consumption expenditure (at constant prices of 1995)

Dependent Variable: DLOG(DE_C95)
Method: Least Squares
Date: 05/29/04 Time: 18:03
Sample: 1982:1 2003:4
Included observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.371217	0.109777	3.381559	0.0012
Z1	-0.174973	0.007674	-22.80067	0.0000
Z2	-0.028131	0.009344	-3.010646	0.0036
Z3	-0.083481	0.013626	-6.126537	0.0000
Z1*S9101	0.051425	0.006668	7.712279	0.0000
Z2*S9101	0.005192	0.007206	0.720556	0.4736
Z3*S9101	0.026626	0.006723	3.960443	0.0002
S9101(-1)	-0.127337	0.012092	-10.53065	0.0000
S9101	0.156785	0.011595	13.52226	0.0000
I9001	0.028750	0.009503	3.025413	0.0035
I9301	-0.038122	0.009500	-4.012777	0.0001
LOG(DE_C95(-1))	**-0.411866**	**0.096750**	**-4.257002**	**0.0001**
LOG(DE_DISPY95(-1))	**0.335856**	**0.096092**	**3.495166**	**0.0008**
D(DE_RS3M95(-5))	-0.002627	0.001249	-2.102585	0.0391
DLOG(DE_U(-2))	-0.079421	0.028407	-2.795838	0.0067
@PCHY((DE_PC(-4)))	-0.324567	0.090275	-3.595302	0.0006
DLOG(DE_DISPY95(-6))	-0.130219	0.055136	-2.361759	0.0210
DLOG(DE_C95(-2))	-0.112105	0.055496	-2.020050	0.0472

R-squared	0.981558	Mean dependent var	0.006034
Adjusted R-squared	0.977079	S.D. dependent var	0.057110
S.E. of regression	0.008646	Akaike info criterion	-6.483136
Sum squared resid	0.005233	Schwarz criterion	-5.976408
Log likelihood	303.2580	F-statistic	219.1559
Durbin-Watson stat	2.031037	Prob(F-statistic)	0.000000

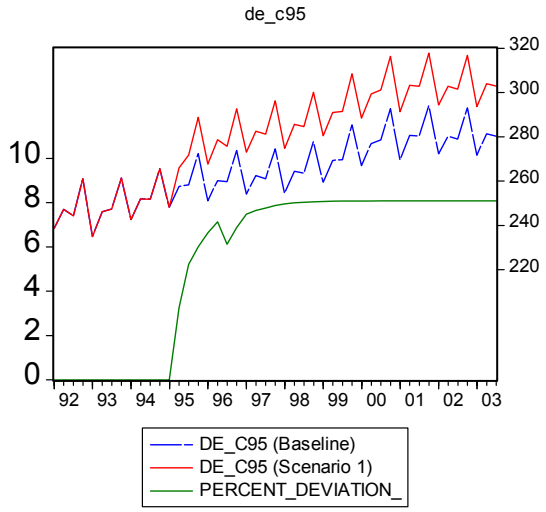
Private consumption expenditure depends in the long run on private household's disposable income. The long run elasticity is 0.82. In the short run nominal short term interest rates, unemployment figures and the inflation rate influence real private consumption. All these variables determining the short run development of private consumption have negative impact on private consumption.

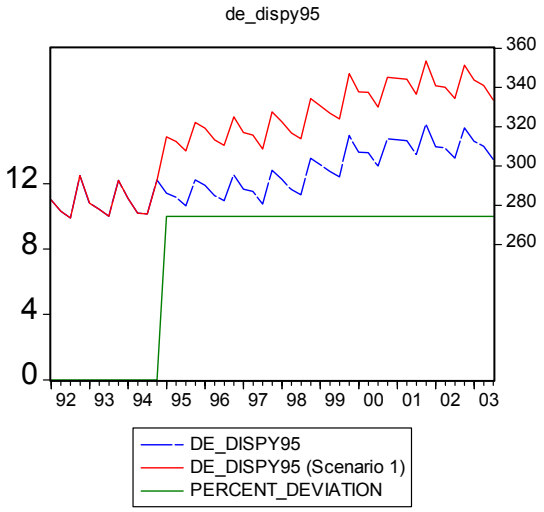
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.833771	Root Mean Squared Error	2.174254
Serial Correlation LM test (lag 1)	0.853851	Mean Absolute Percent Error	0.747546
Serial Correlation LM test (lag 4)	0.676389	Theil inequality coefficient	0.004681
White's heteroscedasticity test	0.657357	Bias proportion	0.000410
RESET test (No. of fitted terms:1)	0.031171	Variance proportion	0.004029
ARCH LM test (lag 1)	0.559167	Covariance proportion	0.995561
ARCH LM test (lag 4)	0.382290		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

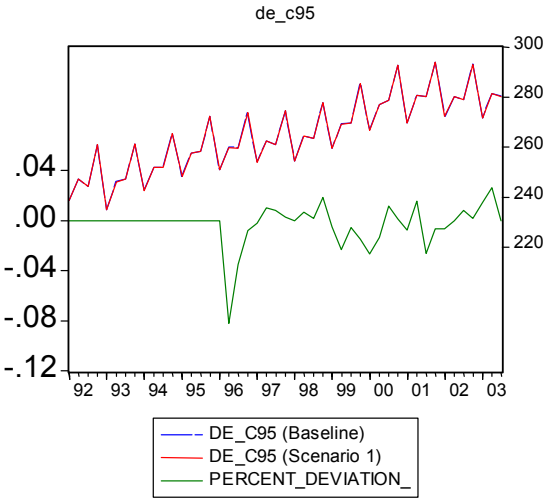
Simulation properties of the equation:

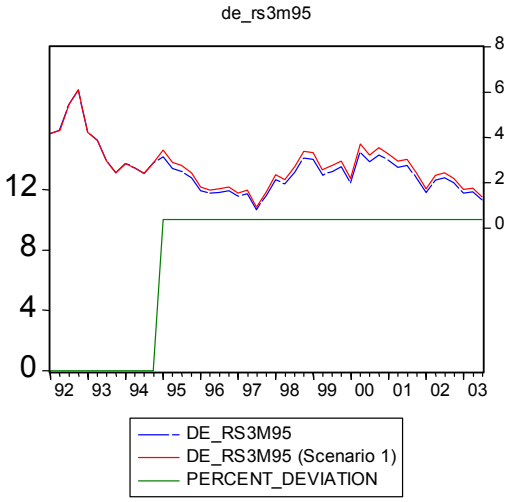
10% increase in real disposable income



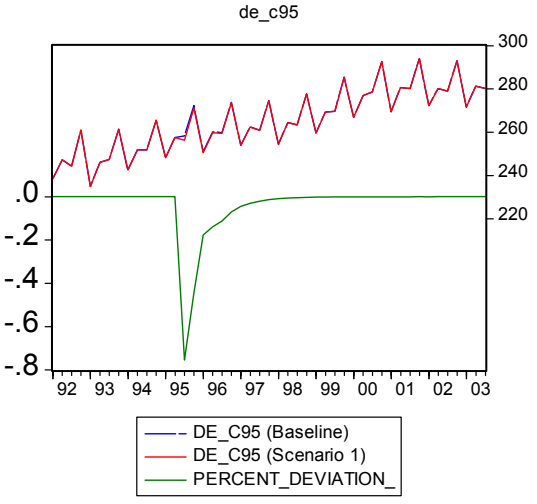


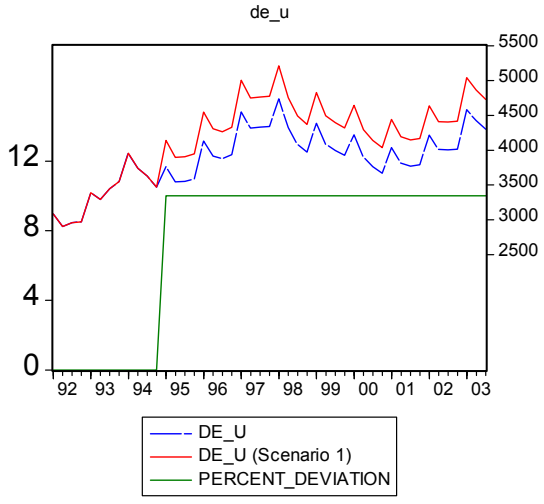
1 percentage point increase in short-term interest rate





10% increase in unemployment





A.2. Government Consumption

Government Consumption (at constant prices of 1995)

Dependent Variable: DLOG(DE_CGOV95)
Method: Least Squares
Date: 05/29/04 Time: 18:04
Sample: 1991:1 2003:4
Included observations: 52

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.117131	0.192802	-0.607521	0.5467
Z1	-0.053860	0.006164	-8.737979	0.0000
Z2	-0.052925	0.005766	-9.179402	0.0000
Z3	-0.053173	0.004525	-11.74984	0.0000
I9501	-0.037176	0.010989	-3.383113	0.0015
LOG(DE_CGOV95(-1)	**-0.462997**	**0.065822**	**-7.034112**	**0.0000**
LOG(DE_GDP95(-1))	**0.359902**	**0.069107**	**5.207869**	**0.0000**
DLOG(DE_GDP95)	0.744834	0.109423	6.806931	0.0000
DLOG(DE_GDP95(-4))	-0.239665	0.086050	-2.785177	0.0079

R-squared	0.947147	Mean dependent var	0.007552
Adjusted R-squared	0.937314	S.D. dependent var	0.041769
S.E. of regression	0.010458	Akaike info criterion	-6.126840
Sum squared resid	0.004703	Schwarz criterion	-5.789125
Log likelihood	168.2978	F-statistic	96.32273
Durbin-Watson stat	2.006102	Prob(F-statistic)	0.000000

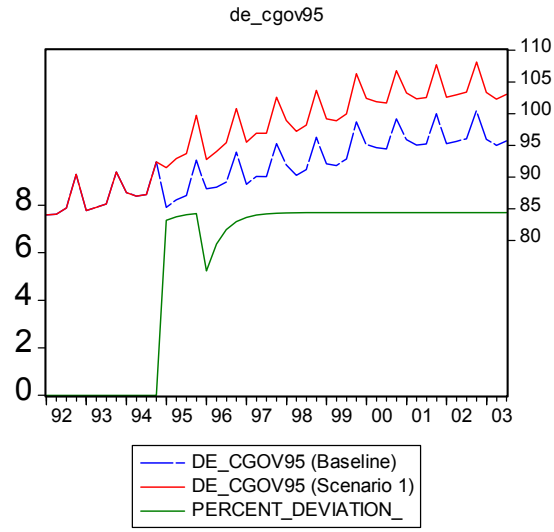
In the equation above government consumption at constant prices is explained by a simple reaction function. The long run elasticity with regard to the real GDP is much below unity.

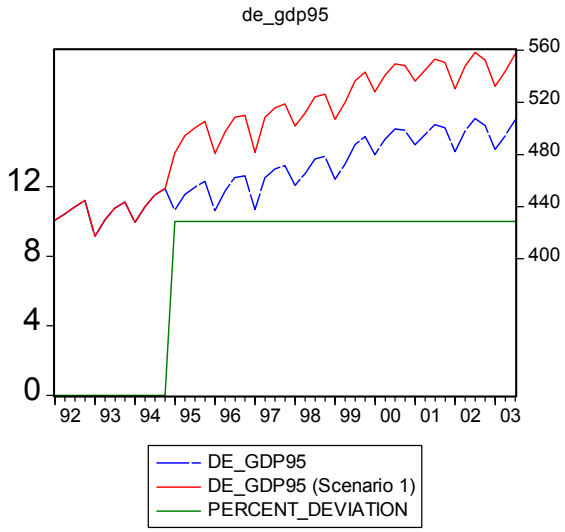
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.876991	Root Mean Squared Error	1.071793
Serial Correlation LM test (lag 1)	0.916921	Mean Absolute Percent Error	0.918116
Serial Correlation LM test (lag 4)	0.791392	Theil inequality coefficient	0.005876
White's heteroscedasticity test	0.856295	Bias proportion	0.000438
RESET test (No. of fitted terms:1)	0.788497	Variance proportion	0.004443
ARCH LM test (lag 1)	0.279646	Covariance proportion	0.995119
ARCH LM test (lag 4)	0.186380		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation properties of the equation:

10% increase in GDP95





A.3. Investment

Investment: machinery & equipment (at constant prices of 1995)

Dependent Variable: DLOG(DE_IMEQ95)
Method: Least Squares
Date: 11/10/04 Time: 16:47
Sample: 1984:1 2003:4
Included observations: 80

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.291743	0.193198	-1.510069	0.1360
Z1	-0.412053	0.028528	-14.44371	0.0000
Z2	-0.050715	0.032076	-1.581112	0.1189
Z3	-0.127799	0.042732	-2.990679	0.0040
Z1*S9101	0.143413	0.017512	8.189511	0.0000
Z2*S9101	0.090961	0.017925	5.074491	0.0000
Z3*S9101	0.063429	0.020440	3.103167	0.0029
I9101	0.199628	0.026992	7.395923	0.0000
LOG(DE_IMEQ95(-1))	**-0.210675**	**0.049485**	**-4.257370**	**0.0001**
LOG(DE_END95(-1))	**0.167850**	**0.054426**	**3.084011**	**0.0030**
DE_RL5Y(-1)	**-0.005244**	**0.002541**	**-2.063927**	**0.0431**
DLOG(DE_CAPA)	1.376825	0.228558	6.023973	0.0000
DLOG(DE_LSTK95(-3))+DLOG(DE_LSTK95(-6))	-0.411903	0.171579	-2.400664	0.0193
DLOG(DE_IMEQ95(-10))	0.211199	0.069330	3.046269	0.0034
DLOG(DE_END95(-2))	0.746972	0.182672	4.089143	0.0001
DLOG(DE_END95(-3))+DLOG(DE_END95(-5))	0.404862	0.143563	2.820100	0.0064
D(DE_RL5Y(-1))+D(DE_RL5Y(-5))+D(DE_RL5Y(-4))+D(DE_RL5Y(-9))	0.014128	0.003953	3.573683	0.0007

R-squared	0.987633	Mean dependent var	0.005525
Adjusted R-squared	0.984492	S.D. dependent var	0.174901
S.E. of regression	0.021780	Akaike info criterion	-4.629513
Sum squared resid	0.029886	Schwarz criterion	-4.123333
Log likelihood	202.1805	F-statistic	314.4543
Durbin-Watson stat	1.997762	Prob(F-statistic)	0.000000

In some theoretical models, net investment is the dependent variable. However, the investment variable used in our estimation is gross investment, which consists of expenditures for capital goods. Since available measurements of depreciations are largely arbitrary, the choice of gross investment in most empirical estimations is dictated by data availability.
Gross replacement is dominated by replacement investment which is proportional to capital stock. Therefore, gross investment has the similar statistical property as capital stock and can be cointegrated with output. Indeed, we find a cointegration between German gross investment in machinery and equipment, a demand and a cost variable. The demand side is reflected by total demand (sum of consumption, gross fixed capital formation and exports). For modelling the costs of an investment, we use the capital market interest rate. These two variables explain the development of investment in the long run and are therefore part of the cointegration relationship. Comparable results can be seen in the macro econometric model of German central bank.
For the short run adjustment unit labour costs as well as a simple indicator for the capacity utilisation are important. While unit labour costs and costs due to interest payments affect investment negatively, total demand and capacity utilisation have a positive influence.
It is usually assumed that the expectations of entrepreneurs are positive (negative), if gross domestic product grows faster (more slowly) than its trend. In this analysis the deviation of gross domestic product from its trend (capacity utilisation) is used as an indicator for the present and future economic situation.
Dummy variables have been used to control for a change in the seasonal pattern after German reunification.

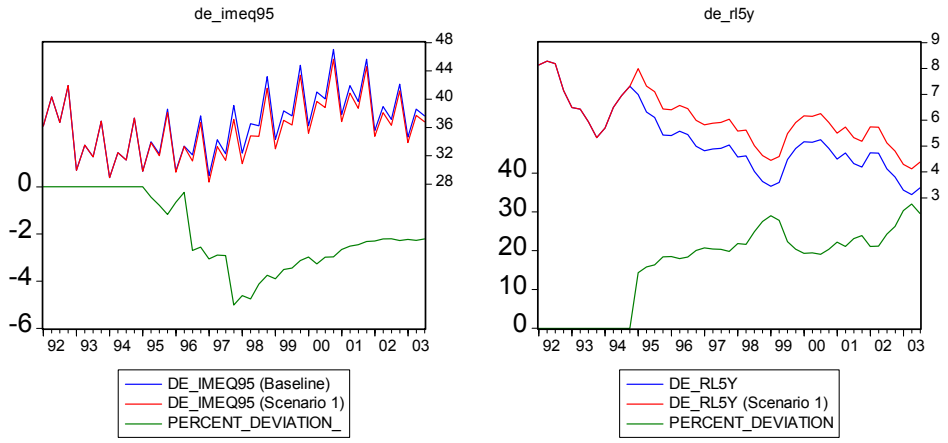
Finally, the sample size was shortened to the period 1983:1-2003:4, since we recognized stability problems in the years 1980:1-1982:4.

Residual tests	*Probability*	*Forecast evaluation (dynamic in-sample)*	
Normality test (Jarque-Bera)	0.774328	Root Mean Squared Error	1.237841
Serial Correlation LM test (lag 1)	0.886471	Mean Absolute Percent Error	2.444137
Serial Correlation LM test (lag 4)	0.632182	Theil inequality coefficient	0.018654
White's heteroscedasticity test	0.029485	Bias proportion	0.009352
RESET test (No. of fitted terms:1)	0.678660	Variance proportion	0.049434
ARCH LM test (lag 1)	0.054490	Covariance proportion	0.941214
ARCH LM test (lag 4)	0.024887		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

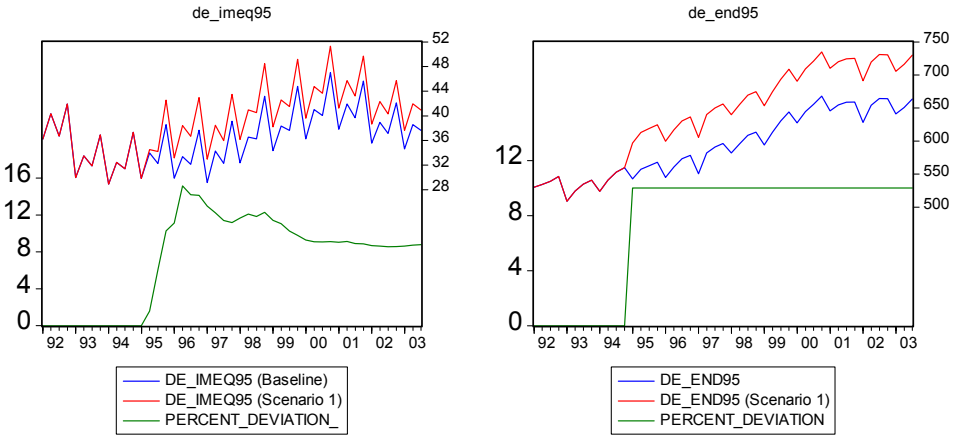
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation properties of the equation:

1% Point increase in the nominal interest rate



10% increase in the total demand



Investment: dwellings (at constant prices of 1995)

Dependent Variable: DLOG(DE_ID95)
Method: Least Squares
Date: 05/29/04 Time: 18:08
Sample(adjusted): 1981:1 2003:4
Included observations: 92 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.348597	0.839819	-2.796551	0.0064
Z1	-0.040514	0.011944	-3.392077	0.0011
Z2	0.122872	0.025051	4.904815	0.0000
Z3	0.052551	0.011592	4.533426	0.0000
I8501	-0.174129	0.034031	-5.116734	0.0000
I9101	0.115933	0.034913	3.320666	0.0013
I8701	-0.143414	0.035640	-4.023914	0.0001
LOG(DE_ID95(-1))	**-0.194630**	**0.050225**	**-3.875148**	**0.0002**
@MOVAV(DE_RL5Y(-1),4)	**-0.003795**	**0.002362**	**-1.606197**	**0.1121**
DLOG(DE_ID95(-4))	0.471505	0.069131	6.820461	0.0000
LOG(DE_POPUL(-1))	**0.269783**	**0.088779**	**3.038836**	**0.0032**

R-squared	0.960069	Mean dependent var	0.003787
Adjusted R-squared	0.955140	S.D. dependent var	0.155028
S.E. of regression	0.032835	Akaike info criterion	-3.882841
Sum squared resid	0.087330	Schwarz criterion	-3.581323
Log likelihood	189.6107	F-statistic	194.7524
Durbin-Watson stat	2.180951	Prob(F-statistic)	0.000000

Investment in residential buildings of households and firms are primarily explained by the development of the population and the nominal long term interest rates. These variables explain the development of investment in the long run and form therefore the cointegration relationship.

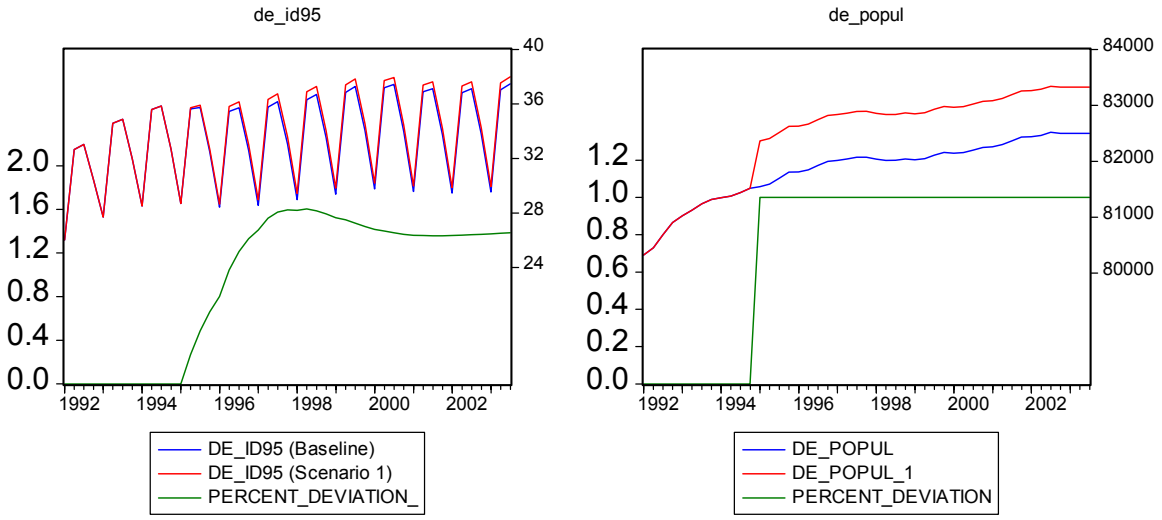
The impuls dummies were needed to control for some outliers. The one in 1991:1 is due to German reunification.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.584359	Root Mean Squared Error	1.304466
Serial Correlation LM test (lag 1)	0.400003	Mean Absolute Percent Error	0.030310
Serial Correlation LM test (lag 4)	0.876020	Theil inequality coefficient	0.006744
White's heteroscedasticity test	0.078337	Bias proportion	0.030639
RESET test (No. of fitted terms:1)	0.900487	Variance proportion	0.962617
ARCH LM test (lag 1)	0.543674	Covariance proportion	
ARCH LM test (lag 4)	0.255930		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation properties of the equation:

1% increase in population



Investment: Non-residential buildings (at constant prices of 1995)

Dependent Variable: DLOG(DE_INRB95)
Method: Least Squares
Date: 05/29/04 Time: 22:44
Sample(adjusted): 1983:1 2003:4
Included observations: 84 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.915387	0.241019	-3.797982	0.0003
Z1	-0.360025	0.062003	-5.806588	0.0000
Z2	0.287753	0.023328	12.33489	0.0000
Z3	-0.126251	0.060082	-2.101298	0.0394
I9101	0.296663	0.035817	8.282691	0.0000
Z1*S9101	0.159514	0.024850	6.419183	0.0000
Z2*S9101	-0.072478	0.019748	-3.670160	0.0005
Z3*S9101	0.037924	0.024814	1.528357	0.1312
S91_97	0.074418	0.013168	5.651439	0.0000
LOG(DE_INRB95(-1))	**-0.396160**	**0.060707**	**-6.525789**	**0.0000**
LOG(DE_IEND95(-1))	**0.334668**	**0.061707**	**5.423531**	**0.0000**
DE_RL5Y(-1)	**-0.005177**	**0.003568**	**-1.451030**	**0.1515**
DLOG(DE_CAPA)	2.769616	0.286948	9.651973	0.0000
D(DE_RL5Y(-5))	-0.028664	0.008886	-3.225843	0.0020
D(DE_RL5Y(-11))	-0.015834	0.007184	-2.204174	0.0310
DLOG(DE_ULC95(-4))+DLOG(DE_ULC95(-6))	-0.641330	0.286943	-2.235044	0.0288
DLOG(DE_INRB95(-3))+DLOG(DE_INRB95(-4))+DLOG(DE_INRB95(-5))+DLOG(DE_INRB95(-6))+DLOG(DE_INRB95(-7))+DLOG(DE_INRB95(-9))	0.226348	0.043021	5.261362	0.0000
DLOG(DE_IEND95(-1))	0.550111	0.168308	3.268477	0.0017

R-squared	0.968944	Mean dependent var	0.003762
Adjusted R-squared	0.960944	S.D. dependent var	0.142178
S.E. of regression	0.028098	Akaike info criterion	-4.118829
Sum squared resid	0.052107	Schwarz criterion	-3.597940
Log likelihood	190.9908	F-statistic	121.1278
Durbin-Watson stat	2.363942	Prob(F-statistic)	0.000000

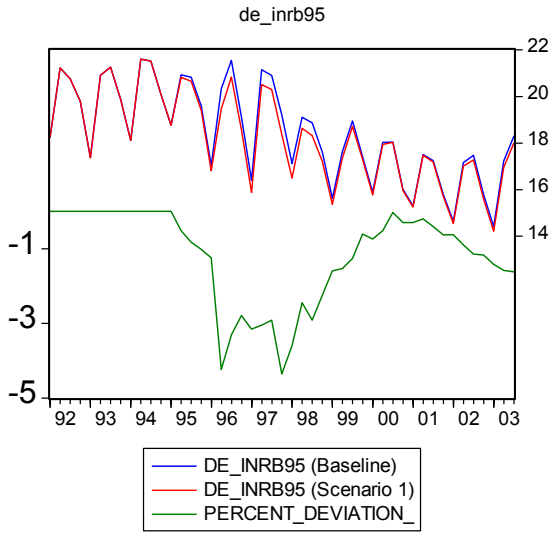
There is a long-run relationship between investment in non-residential buildings, domestic demand and interest costs. In the short-run, labour costs play a role, too. Whereas labour costs and interest costs negatively affect investment, domestic demand has a positive influence. In this study, deviations of the GDP from its trend are used in order to account for the expectations of entrepreneurs with regard to the economic situation. It is expected that there is a positive relationship between changes in this variable and the growth of investment. Dummy variables have been used to account for a change in the seasonal pattern due to German unification. Additionally, an impuls dummy is needed to correct for an outlier in the first quarter 1991, which is also due to German reunification.

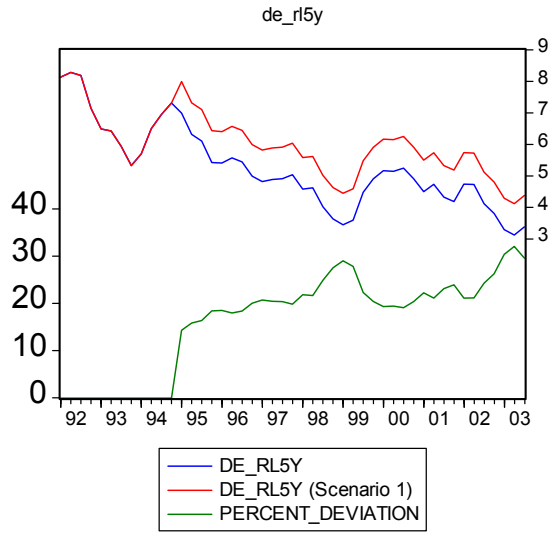
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.911606	Root Mean Squared Error	0.527503
Serial Correlation LM test (lag 1)	0.027308	Mean Absolute Percent Error	2.445951
Serial Correlation LM test (lag 4)	0.154800	Theil inequality coefficient	0.016006
White's heteroscedasticity test	0.408749	Bias proportion	0.002106
RESET test (No. of fitted terms:1)	0.589519	Variance proportion	0.000008
ARCH LM test (lag 1)	0.304361	Covariance proportion	0.997886
ARCH LM test (lag 4)	0.336360		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

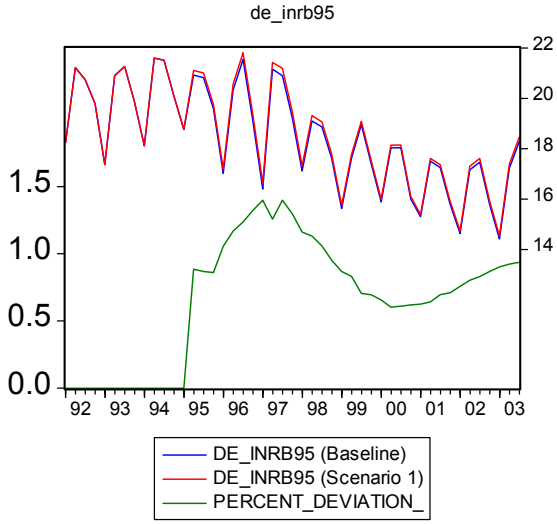
Simulation property of the equation

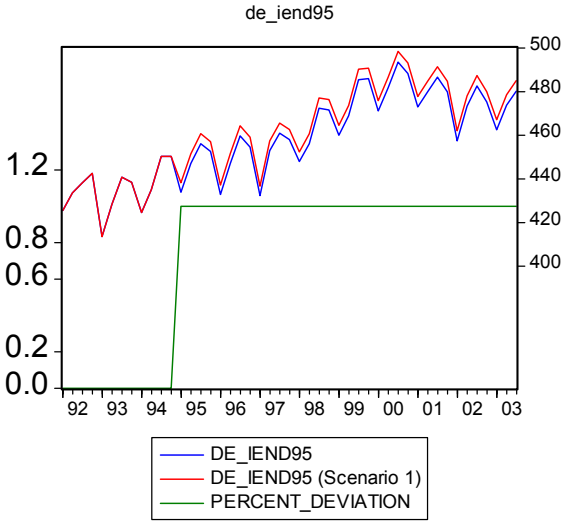
1% Point increase the nominal interest rate





1% increase in domestic demand





Other fixed capital formation (at constant prices of 1995)

Dependent Variable: DLOG(DE_IOTH95)
Method: Least Squares
Date: 05/29/04 Time: 18:10
Sample: 1980:1 2003:4
Included observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.110349	0.038935	-2.834217	0.0057
Z1	-0.033826	0.009885	-3.422015	0.0009
Z2	-0.007496	0.006525	-1.148858	0.2537
Z3	-0.009655	0.005998	-1.609735	0.1110
LOG(DE_IOTH95(-1))	**-0.174300**	**0.055546**	**-3.137931**	**0.0023**
@TREND(1970:1)	**0.003495**	**0.001130**	**3.091995**	**0.0027**
DLOG(DE_IOTH95(-4))	0.635647	0.073951	8.595489	0.0000

R-squared	0.878802	Mean dependent var	0.018952
Adjusted R-squared	0.870632	S.D. dependent var	0.055602
S.E. of regression	0.019999	Akaike info criterion	-4.916152
Sum squared resid	0.035596	Schwarz criterion	-4.729168
Log likelihood	242.9753	F-statistic	107.5563
Durbin-Watson stat	2.017948	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.722997	Root Mean Squared Error	0.130147
Serial Correlation LM test (lag 1)	0.951267	Mean Absolute Percent Error	0.025539
Serial Correlation LM test (lag 4)	0.010155	Theil inequality coefficient	0.010928
White's heteroscedasticity test	0.526579	Bias proportion	0.000619
RESET test (No. of fitted terms:1)	0.567070	Variance proportion	0.988453
ARCH LM test (lag 1)	0.824425	Covariance proportion	
ARCH LM test (lag 4)	0.590979		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Changes in stocks (at constant prices of 1995)

Dependent Variable: DE_IS95
Method: Least Squares
Date: 05/29/04 Time: 18:11
Sample(adjusted): 1980:3 2003:4
Included observations: 94 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.109669	0.318441	-0.344393	0.7314
Z1	21.44856	2.265565	9.467201	0.0000
Z2	7.438993	1.309104	5.682509	0.0000
Z3	15.69871	1.786746	8.786201	0.0000
DE_IS95(-1)	0.407963	0.090270	4.519361	0.0000
DE_IS95(-4)	0.184017	0.078811	2.334929	0.0220
S9101	-1.065315	0.458293	-2.324529	0.0226
S9101*Z1	10.02582	1.586811	6.318224	0.0000
S9101*Z2	1.507536	1.209504	1.246409	0.2162
S9101*Z3	6.043496	1.335887	4.523959	0.0000
D(DE_END95(-1))	0.052943	0.029012	1.824897	0.0717
D(DE_END95(-0))	0.067705	0.028931	2.340217	0.0217

R-squared	0.959725	Mean dependent var	-0.604787
Adjusted R-squared	0.954323	S.D. dependent var	9.088016
S.E. of regression	1.942312	Akaike info criterion	4.284379
Sum squared resid	309.3512	Schwarz criterion	4.609055
Log likelihood	-189.3658	F-statistic	177.6386
Durbin-Watson stat	1.828780	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.752360	Root Mean Squared Error	1.667408
Serial Correlation LM test (lag 1)	0.201715	Mean Absolute Percent Error	0.118193
Serial Correlation LM test (lag 4)	0.035177	Theil inequality coefficient	0.000076
White's heteroscedasticity test	0.323985	Bias proportion	0.014214
RESET test (No. of fitted terms:1)	0.659078	Variance proportion	0.985710
ARCH LM test (lag 1)	0.956301	Covariance proportion	
ARCH LM test (lag 4)	0.762921		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

A.4. Export of Goods and Services

German export of goods to the EMU (at constant prices of 1995)

Dependent Variable: DLOG(DE_XG95_EWU)
Method: Least Squares
Date: 05/29/04 Time: 21:45
Sample(adjusted): 1985:1 2002:4
Included observations: 72 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_XG95_EWU(-1))	**-0.613016**	**0.118086**	**-5.191255**	**0.0000**
LOG(EU8ODE_IFC95(-1))	**0.402416**	**0.111790**	**3.599760**	**0.0007**
LOG(DE_RAW_EWU(-1))	**-0.742188**	**0.224661**	**-3.303588**	**0.0016**
C	0.452242	1.631867	0.277132	0.7826
@TREND(1970:1)	**0.004232**	**0.001067**	**3.968127**	**0.0002**
Z1	0.142467	0.051266	2.778992	0.0073
Z2	0.012773	0.020855	0.612467	0.5426
Z3	0.027192	0.044549	0.610384	0.5440
D(LOG(DE_XG95_EWU(-2)))	0.168956	0.106933	1.580012	0.1195
D(LOG(DE_XG95_EWU(-3)))	0.091798	0.104418	0.879140	0.3829
D(LOG(DE_XG95_EWU(-4)))	0.199927	0.098341	2.032996	0.0466
D(LOG(EU8ODE_IFC95))	0.759286	0.205180	3.700583	0.0005
D(LOG(DE_RAW_EWU))	-0.974162	0.386502	-2.520457	0.0144

R-squared	0.873798	Mean dependent var	0.010526
Adjusted R-squared	0.848130	S.D. dependent var	0.064539
S.E. of regression	0.025151	Akaike info criterion	-4.365850
Sum squared resid	0.037322	Schwarz criterion	-3.954785
Log likelihood	170.1706	F-statistic	34.04204
Durbin-Watson stat	1.937383	Prob(F-statistic)	0.000000

The basis explanatory variables are typically derived from consumer theory, according to which aggregate demand depends on aggregate income and commodity prices (For a survey see Goldstein/Khan 1985, Sawyer/Sprinkle 1999). Recent literature additionally includes a proxy for the growing international division of labor (Strauß 2000, 2003, Stephan 2002, Lapp et al. 1995, Döpke/Fischer 1994). Germany‘s export of goods to the EMU is explained by a demand variable that reflects the economic activity in the euro area (real investment activity in the EU7 countries (France, Italy, Spain, the Netherlands, Belgium, Finland and Austria)), by a linear trend approximating the growing international division of labor and by a variable that reflects the price competitiveness of German exporters. Originally, this variable has been the real external value of the Deutsche Mark in relation to a basket of the European currencies. It was compiled by weighting the bilateral real external values (based on relative consumer prices) with the respective country’s share in German exports. After the introduction of the euro there are no longer exchange rate fluctuations and this variable therefore reflects from 1999 onwards differences in the price development in Germany and in the other EMU member countries. The demand aggregate is calculated by adding the national figures of investment in fixed capital which are converted into euro using the corresponding fixed conversion rates. Thus distorsions in the aggregate due exchange rate fluctuations are avoided (see Beyer et al. 2000). The cointegration relationship is highly significant. In the long run, the impact of the price competitiveness of German exporters is stronger than the effect of the demand from abroad.

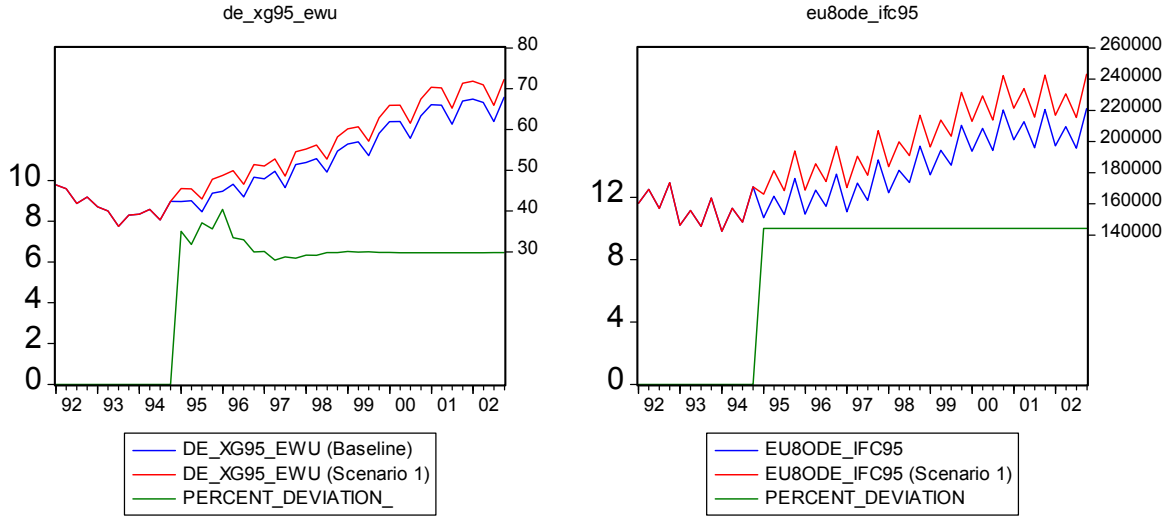
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.301020	Root Mean Squared Error	1.311844
Serial Correlation LM test (lag 1)	0.154677	Mean Absolute Percent Error	2.342146
Serial Correlation LM test (lag 4)	0.273964	Theil inequality coefficient	0.014754
White's heteroscedasticity test	0.527550	Bias proportion	0.000114
RESET test (No. of fitted terms:1)	0.499559	Variance proportion	0.046065
ARCH LM test (lag 1)	0.829419	Covariance proportion	0.953821
ARCH LM test (lag 4)	0.753555		
Stability tests			

CUSUM test[a]	0
CUSUM^2 test[a]	0

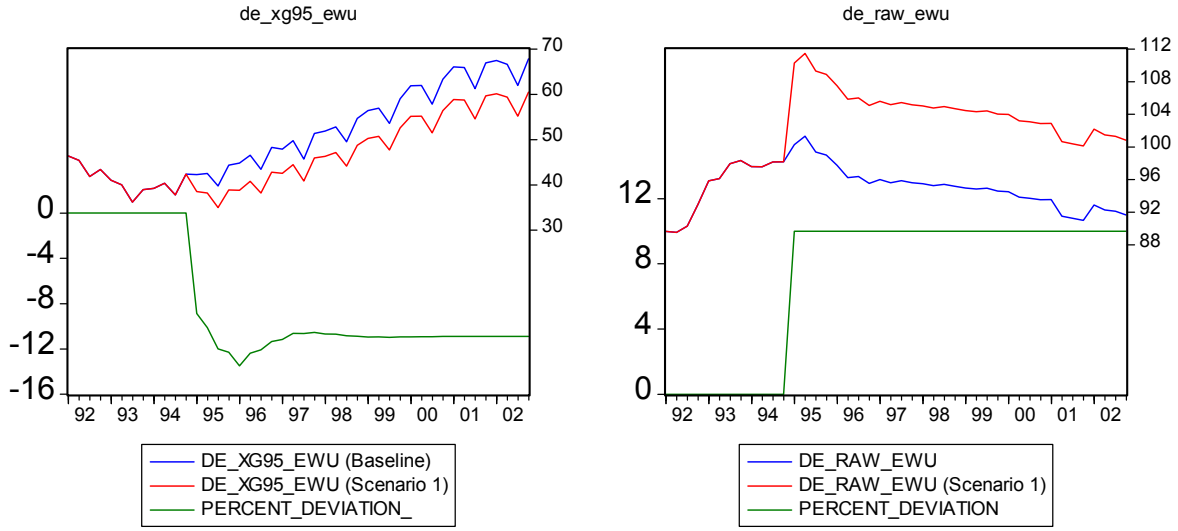
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation:

10% increase in EMU investment activity



10% loss in price competitiveness



German export of goods to the UK at 1995 prices

Dependent Variable: DLOG(DE_XG95_UK)
Method: Least Squares
Date: 05/29/04 Time: 17:18
Sample: 1985:1 2003:4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_XG95_UK(-1))	**-0.511010**	**0.116176**	**-4.398598**	**0.0000**
LOG(UK_IFC95(-1))	**0.301364**	**0.101628**	**2.965360**	**0.0042**
LOG(DE_RAW_UK(-1))	**-0.178777**	**0.053859**	**-3.319341**	**0.0015**
UK_KT91	**0.003870**	**0.000873**	**4.432800**	**0.0000**
C	0.397442	0.363562	1.093190	0.2783
D(LOG(DE_XG95_UK(-1)))	-0.198250	0.094408	-2.099936	0.0396
D(LOG(DE_XG95_UK(-4)))	0.200589	0.079435	2.525200	0.0140
DLOG(UK_IFC95(-1))	0.595358	0.159042	3.743395	0.0004
DLOG(DE_RAW_UK)	-0.410317	0.111175	-3.690743	0.0005
UK_I9502	0.132646	0.037675	3.520756	0.0008

R-squared	0.642742	Mean dependent var	0.010756
Adjusted R-squared	0.594025	S.D. dependent var	0.055472
S.E. of regression	0.035344	Akaike info criterion	-3.725273
Sum squared resid	0.082449	Schwarz criterion	-3.418598
Log likelihood	151.5604	F-statistic	13.19337
Durbin-Watson stat	2.046949	Prob(F-statistic)	0.000000

Modelling Germany's exports to the UK for the past two decades is very difficult, because the estimation sample covers two periods with a totally different economic development in the UK. During the eighties M. Thatcher forced a deregulation and privatization policy and at the beginning of the nineties, Great Britain went through a economic crisis. Since 1992 the UK experiences a robust economic upswing with growth rates that are significantly higher than those in the EMU. Especially, a strong private consumption – like in the United States – has to a large extent contributed to this development. Against this background it is not surprising that the size of income and price elasticities of German exports to the UK are different in the eighties and in the nineties. Therefore, a kinked trend was included in the regression to account for the different slope of the trend in the two periodes.

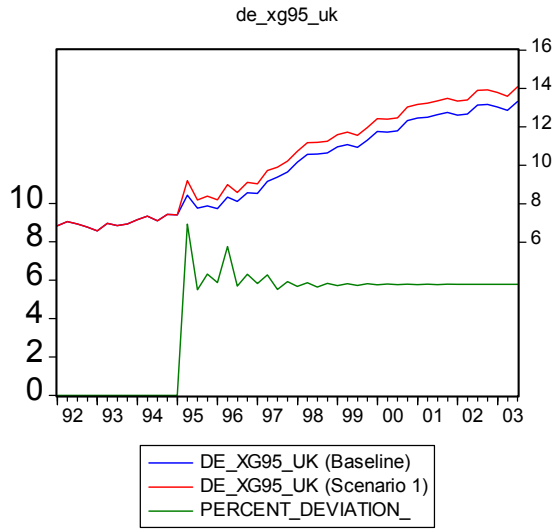
Germany's export of goods to the UK is explained by a demand variable that reflects the economic activity in the UK (real GDP), by a variable that reflects the price competitiveness of German exporters (real external value of the euro in relation to the British Pound, based on relative consumer prices) and by a linear trend approximating the growing international division of labor. The cointegration relationship is highly significant and only a parsimonious specification of the short-run dynamics is required.

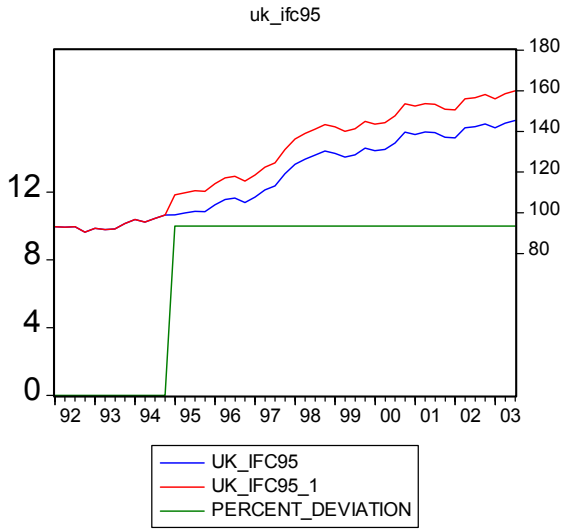
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.292760	Root Mean Squared Error	0.275296
Serial Correlation LM test (lag 1)	0.764740	Mean Absolute Percent Error	0.019598
Serial Correlation LM test (lag 4)	0.884035	Theil inequality coefficient	0.000025
White's heteroscedasticity test	0.922871	Bias proportion	0.002574
RESET test (No. of fitted terms:1)	0.728870	Variance proportion	0.997401
ARCH LM test (lag 1)	0.964836	Covariance proportion	
ARCH LM test (lag 4)	0.995643		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

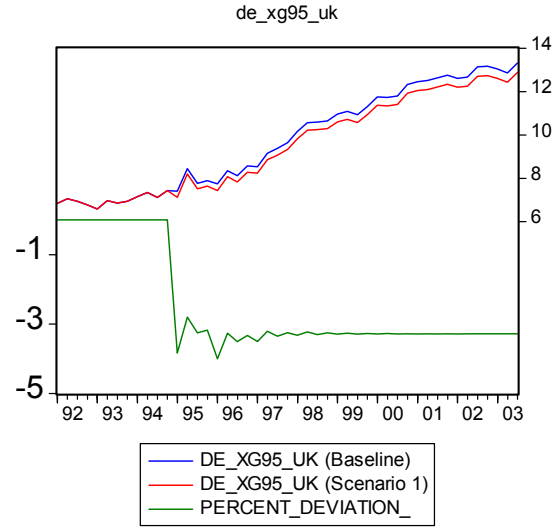
Simulation property of the equation:

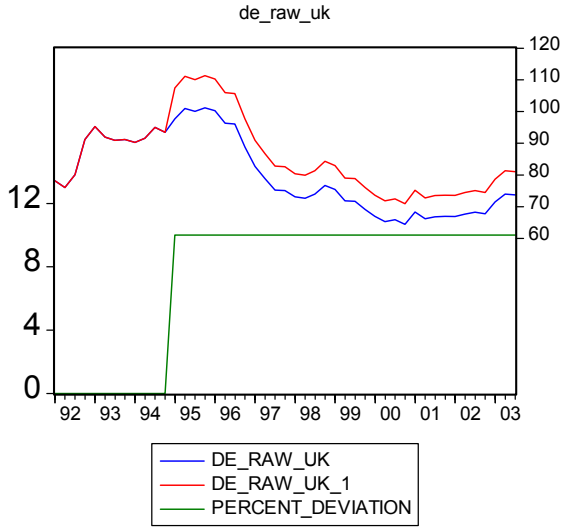
10% increase in UK_IFC95





10% increase in real external value Euro/British Pound





German export of goods to the USA (at constant prices of 1995)

Dependent Variable: DLOG(DE_XG95_US)
Method: Least Squares
Date: 06/01/04 Time: 15:15
Sample(adjusted): 1985Q1 2003Q1
Included observations: 73 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_XG95_US(-1))	**-0.222169**	**0.074009**	**-3.001931**	**0.0039**
LOG(US_IFC95(-1))	**0.342893**	**0.103914**	**3.299764**	**0.0016**
LOG(DE_RAW_US(-1))	**-0.240124**	**0.064174**	**-3.741777**	**0.0004**
C	-0.061196	0.199478	-0.306780	0.7601
Z1	-0.045993	0.015730	-2.923909	0.0049
Z2	-0.035350	0.017378	-2.034162	0.0464
Z3	-0.032942	0.016765	-1.964912	0.0541
DLOG(DE_XG95_US(-1))	-0.335935	0.075896	-4.426274	0.0000
DLOG(DE_XG95_US(-3))	-0.343068	0.076483	-4.485558	0.0000
DLOG(DE_XG95_US(-2))	-0.279762	0.091883	-3.044764	0.0035
DLOG(US_IFC95)	1.425052	0.384313	3.708055	0.0005
DLOG(US_IFC95(-2))	1.675807	0.444228	3.772399	0.0004
DLOG(DE_RAW_US(-1))	-0.265181	0.121280	-2.186520	0.0328
I8801	-0.144239	0.043338	-3.328215	0.0015

R-squared	0.810049	Mean dependent var	0.009526
Adjusted R-squared	0.768196	S.D. dependent var	0.080197
S.E. of regression	0.038612	Akaike info criterion	-3.499885
Sum squared resid	0.087961	Schwarz criterion	-3.060619
Log likelihood	141.7458	F-statistic	19.35440
Durbin-Watson stat	1.985714	Prob(F-statistic)	0.000000

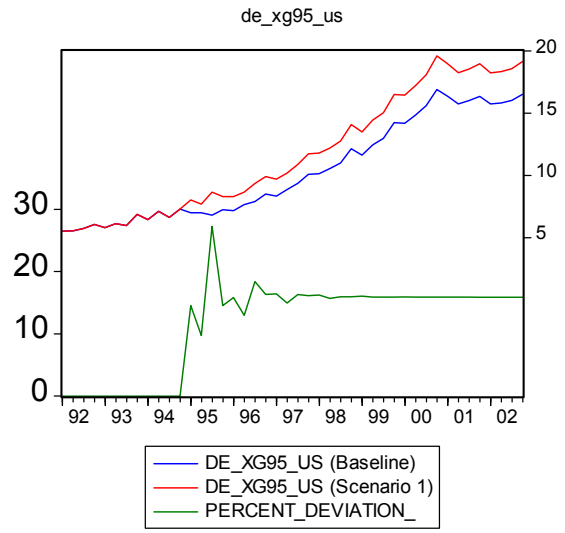
German export of goods to the USA is explained by a demand variable that reflects the economic activity in the USA (investment activity in the USA) and by a variable that reflects the price competitiveness of German exporters (real external value of the euro in relation to the US-Dollar, based on relative consumer prices). The cointegration relationship is significant. The demand effect is more important than the price competitiveness in both the long-run relationship and the short-run dynamics.

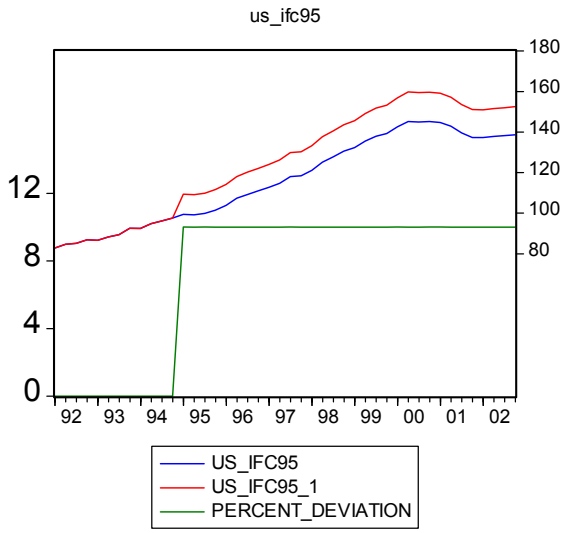
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.074861	Root Mean Squared Error	0.378902
Serial Correlation LM test (lag 1)	0.928083	Mean Absolute Percent Error	3.612016
Serial Correlation LM test (lag 4)	0.561047	Theil inequality coefficient	0.020810
White's heteroscedasticity test	0.261813	Bias proportion	0.000631
RESET test (No. of fitted terms:1)	0.244642	Variance proportion	0.010273
ARCH LM test (lag 1)	0.639084	Covariance proportion	0.989096
ARCH LM test (lag 4)	0.930106		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	8 (1989:4 -92:3)		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

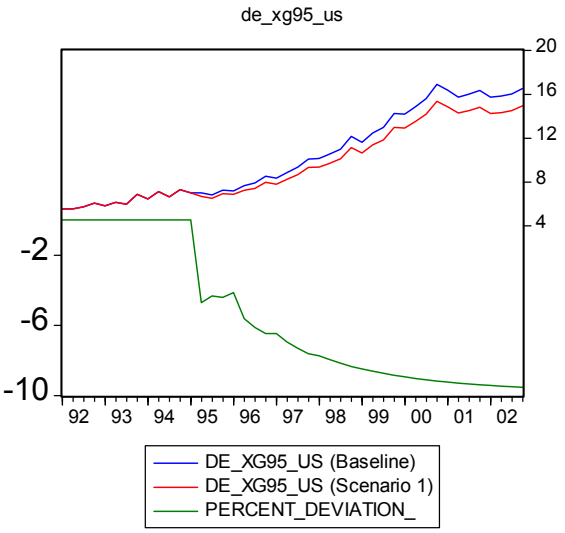
Simulation property of the equation:

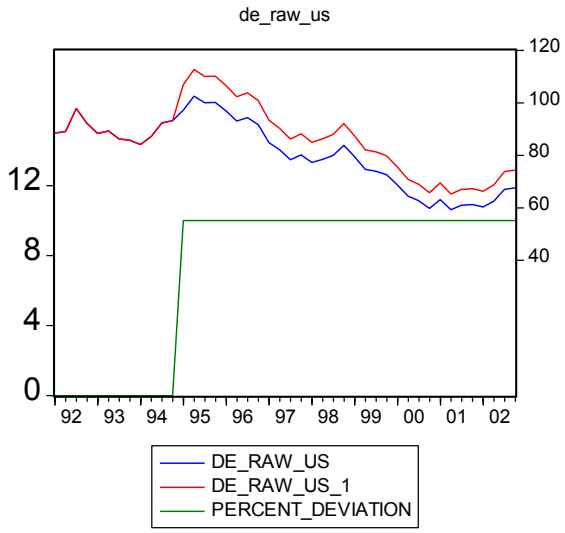
10 % increase in US_IFC95





10% loss in price competitiveness





German export of goods to the rest of the world (at constant prices of 1995)

Dependent Variable: DLOG(DE_XG95_ROW)
Method: Least Squares
Date: 05/29/04 Time: 17:17
Sample: 1985:1 2003:4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.931703	0.560059	3.449103	0.0010
Z1	-0.084469	0.019221	-4.394617	0.0000
Z2	-0.058251	0.014111	-4.128057	0.0001
Z3	-0.054385	0.015983	-3.402645	0.0012
LOG(DE_XG95_ROW(-1))	**-0.504454**	**0.072508**	**-6.957192**	**0.0000**
LOG(ROW_GDP95(-1))	**0.511261**	**0.108777**	**4.700097**	**0.0000**
LOG(DE_RAW_19(-1))	**-0.550374**	**0.117392**	**-4.688358**	**0.0000**
S9301*@TREND(1970:1)	**0.001261**	**0.000170**	**7.413698**	**0.0000**
I9003_04	0.209931	0.023114	9.082568	0.0000
DLOG(DE_XG95_ROW(-1))	-0.147274	0.078533	-1.875302	0.0657
DLOG(DE_XG95_ROW(-2))	-0.224462	0.078730	-2.851042	0.0060
DLOG(DE_XG95_ROW(-4))	0.186082	0.077602	2.397908	0.0197
DLOG(ROW_GDP95(-1))	1.204776	0.561492	2.145669	0.0360
DLOG(DE_RAW_19(-2))	-0.404748	0.256154	-1.580093	0.1194
DLOG(DE_RAW_19(-3))	-0.612404	0.286403	-2.138261	0.0366
I9001	0.107362	0.029963	3.583153	0.0007
I9201	0.104923	0.035846	2.927049	0.0049

R-squared	0.909118	Mean dependent var	0.011101
Adjusted R-squared	0.884472	S.D. dependent var	0.082401
S.E. of regression	0.028008	Akaike info criterion	-4.118508
Sum squared resid	0.046281	Schwarz criterion	-3.597160
Log likelihood	173.5033	F-statistic	36.88721
Durbin-Watson stat	2.047560	Prob(F-statistic)	0.000000

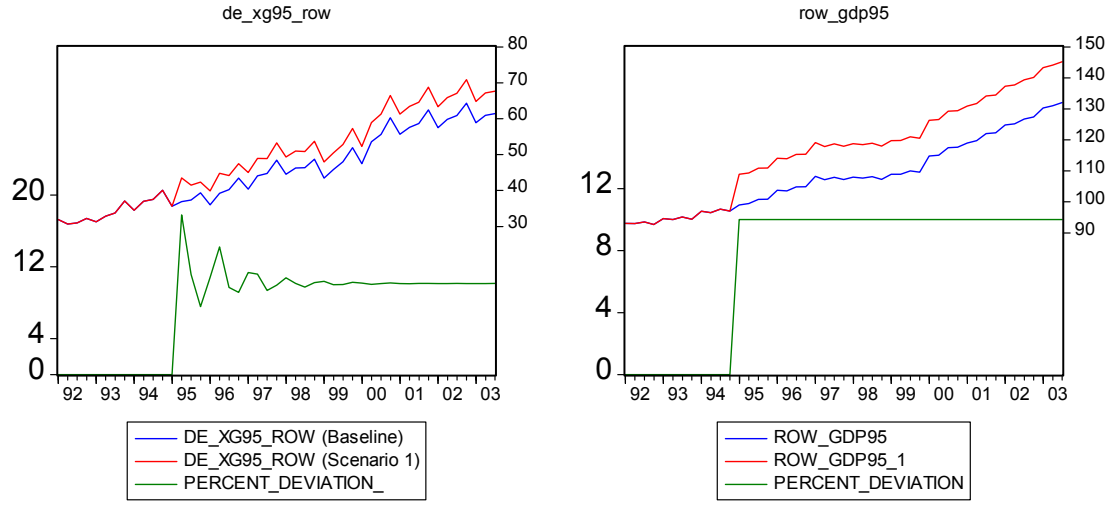
Germany's export of goods to the rest of the world (at the moment Asia, MOE, OPEC,…) is explained by a demand variable (real GDP of the rest of the world) that reflects the economic activity in this region and by a variable that reflects the price competitiveness of German exporters. Here, the real external value of the (DM)Euro in relation to the currencies of a broad group of countries would be appropriate. Therefore, the indicator of the Deutsche Bundesbank (price competitiveness in relation to 19 countries) was used. It is very difficult to estimate this equation, because there is hardly any increase in German export of goods to the rest of the world during the 80s and in this period the exchange rate plays an important role. In the 90s, however, exports to the rest of the world developed very dynamically. This is mainly due to the growth in Asia and the integration of the MOE countries into the world trade. Therefore, the importance of the demand factor increases and the importance of the exchange rate decreases. In order to account for the effect of integration, a linear trend was included in the regression, starting in 1993. This assures the stability of the parameters. Additionally, three impulse dummies are included in the regression. De_i9003_04 is an impulse dummy that accounts for the fact, that in the 3rd and 4th quarter 1990, trade between Eastern and Western Germany was still counted as foreign trade and therefore appeared in the export figures. From 1st quarter 1991 onwards it is counted as intra-German trade. Since Germany's export of goods to the rest of the world is calculated as export of goods (National Accounts Statistics) minus export of goods to the EMU, to the US and to the UK (special trade), this "statistical problem" shows up in the time series for German export of goods to the rest of the world and is eliminated using the impulse dummy. De_i9001 and de_i9201 are also impulse dummies that simply account for two outliers.

Residual tests	*Probability*	*Forecast evaluation (dynamic in-sample)*	
Normality test (Jarque-Bera)	0.999882	Root Mean Squared Error	0.885354
Serial Correlation LM test (lag 1)	0.848264	Mean Absolute Percent Error	0.014938
Serial Correlation LM test (lag 4)	0.252067	Theil inequality coefficient	0.001250
White's heteroscedasticity test	0.289333	Bias proportion	0.010765
RESET test (No. of fitted terms:1)	0.086664	Variance proportion	0.987986
ARCH LM test (lag 1)	0.852411	Covariance proportion	
ARCH LM test (lag 4)	0.666268		
Stability tests			
CUSUM test[a]	7 (2002:2-03:4)		
CUSUM^2 test[a]	0		

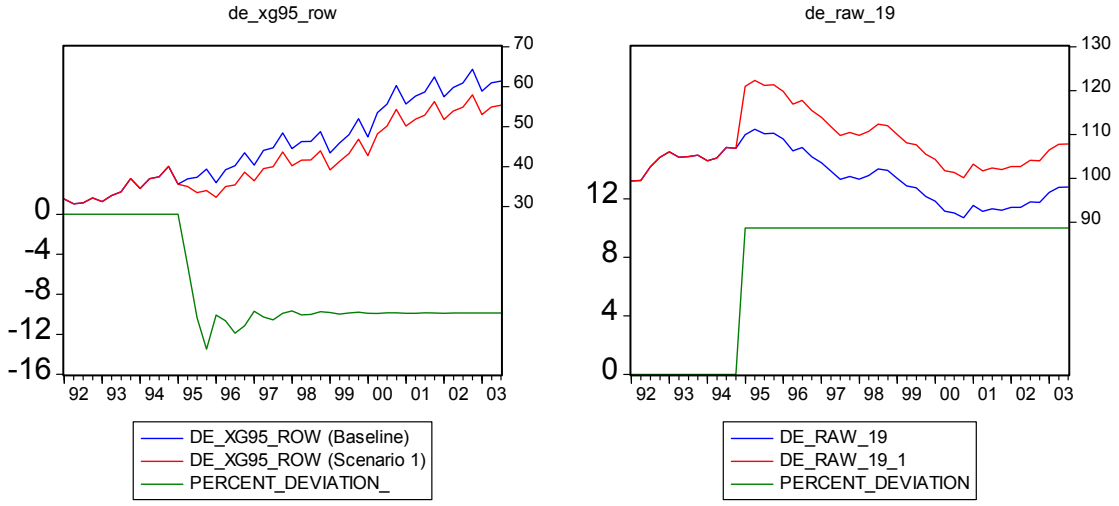
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation:

10% increase in ROW_GDP95



10% loss in price competitiveness



German export of services (at constant prices of 1995)

Dependent Variable: DLOG(DE_XS95)
Method: Least Squares
Date: 05/29/04 Time: 17:18
Sample: 1985:1 2003:4
Included observations: 76

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_XS95(-1))	**-0.779897**	**0.084369**	**-9.243887**	**0.0000**
LOG(DE_XG95(-1))	**0.595796**	**0.067849**	**8.781154**	**0.0000**
LOG(DE_RAW_19(-1))	**-0.735437**	**0.134458**	**-5.469624**	**0.0000**
I9003_04	0.392771	0.041165	9.541400	0.0000
C	2.789438	0.626317	4.453714	0.0000
Z1	-0.043928	0.027130	-1.619173	0.1108
Z2	-0.063697	0.022622	-2.815759	0.0066
Z3	0.069764	0.029550	2.360894	0.0216
D(LOG(DE_XS95(-2)))	0.143406	0.064911	2.209261	0.0311
D(LOG(DE_XS95(-3)))	0.094695	0.053170	1.780990	0.0802
D(LOG(DE_XS95(-4)))	0.136387	0.053738	2.537987	0.0139
I9101	-0.257728	0.071310	-3.614202	0.0006
DLOG(DE_XG95(-0))	0.416482	0.156919	2.654131	0.0102
D(LOG(DE_XG95(-6)))	0.427402	0.150560	2.838752	0.0062
DLOG(DE_RAW_19(-0))	-0.869480	0.369500	-2.353124	0.0220
DLOG(DE_RAW_19(-3))	1.401607	0.397193	3.528780	0.0008
DLOG(DE_RAW_19(-5))	0.848380	0.377480	2.247484	0.0284
I9901	-0.133645	0.043090	-3.101538	0.0030

R-squared	0.926280	Mean dependent var	0.008282
Adjusted R-squared	0.904673	S.D. dependent var	0.128422
S.E. of regression	0.039651	Akaike info criterion	-3.414031
Sum squared resid	0.091186	Schwarz criterion	-2.862015
Log likelihood	147.7332	F-statistic	42.86841
Durbin-Watson stat	1.918505	Prob(F-statistic)	0.000000

The export of services is on the one hand closely related to the export of goods via transportation and related services (assurances etc.). On the other hand it is tourism in Germany (i.e. people coming from all over the world in order to visit Berlin) that depends on the development of the exchange rate. Therefore, a cointegration relationship between the export of services, the export of goods and the real external value of the (DM)Euro in relation to the currencies of a broad group of countries (Bundesbank indicator: price competitiveness in relation to 19 countries) is reasonable. The coefficients have the expected signs: there is a positive relationship between the export of services and the export of goods. This is in line with the expectation that more transportation is required if the export of goods increases. There is a negative relationship between the export of services and the real external value of the (DM)Euro, i.e. if the real external value of the (DM)Euro increases (i.e. the DM(Euro) appreciates), holidays in Germany become more expensive and people would like to spend their holidays somewhere else. DE_I9003_04 is an impuls dummy that catches a special effect in the data: for the third and the forth quarter 1990 export of services to the former GDR are counted as exports to a foreign country. From 1991 onwards it is counted as intra-trade.

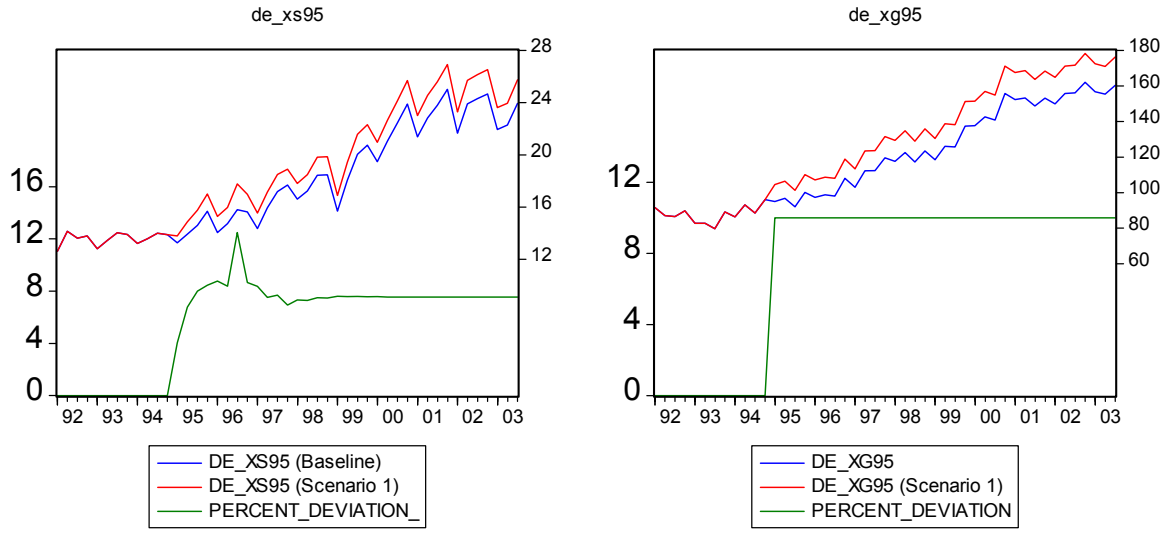
Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.336231	Root Mean Squared Error	0.717146
Serial Correlation LM test (lag 1)	0.637432	Mean Absolute Percent Error	3.372281
Serial Correlation LM test (lag 4)	0.225115	Theil inequality coefficient	0.021912
White's heteroscedasticity test	0.736974	Bias proportion	0.001580
RESET test (No. of fitted terms:1)	0.555248	Variance proportion	0.056279
ARCH LM test (lag 1)	0.316048	Covariance proportion	0.942142
ARCH LM test (lag 4)	0.783574		

Stability tests	
CUSUM test[a]	7 (2002:4-03:4)
CUSUM^2 test[a]	0

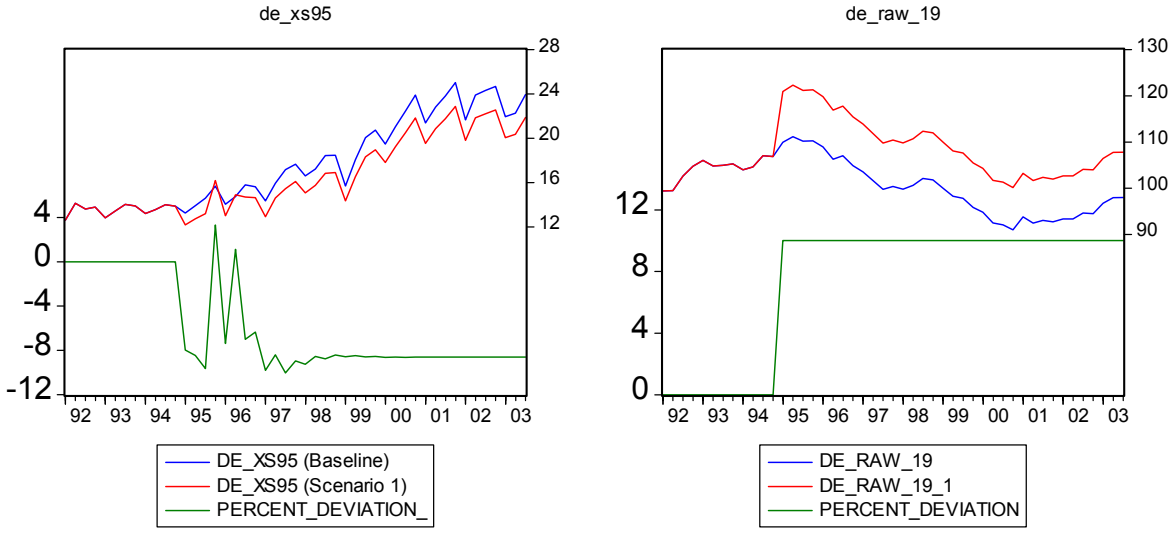
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation:

10% increase in export of goods



10% appreciation of the DM(Euro)



A.5. Import of Goods and Services

German import of goods at 1995 prices

Dependent Variable: DLOG(DE_MG95)
Method: Least Squares
Date: 05/29/04 Time: 17:11
Sample(adjusted): 1980:3 2003:4
Included observations: 94 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.520090	0.360395	1.443110	0.1528
Z1	-0.112771	0.025949	-4.345926	0.0000
Z2	-0.089217	0.020065	-4.446345	0.0000
Z3	-0.113532	0.014368	-7.901677	0.0000
LOG(DE_MG95(-1))	**-0.479852**	**0.102351**	**-4.688310**	**0.0000**
LOG(DE_PREL2(-1))	**-0.225270**	**0.057104**	**-3.944932**	**0.0002**
LOG(DE_XG95(-1))	**0.393178**	**0.083586**	**4.703873**	**0.0000**
LOG(DE_IFC95(-1))	**0.188168**	**0.060226**	**3.124360**	**0.0025**
DLOG(DE_IFC95(-3))	0.190216	0.058030	3.277870	0.0015
DLOG(DE_IFC95(-4))	0.265894	0.070310	3.781761	0.0003
DLOG(DE_XG95(-1))	-0.182698	0.084148	-2.171146	0.0328
DLOG(DE_DISPY95(-1))	0.271223	0.097605	2.778778	0.0068
D(S9301)	-0.103071	0.025784	-3.997526	0.0001

R-squared	0.776348	Mean dependent var	0.011818
Adjusted R-squared	0.743215	S.D. dependent var	0.047824
S.E. of regression	0.024234	Akaike info criterion	-4.474335
Sum squared resid	0.047572	Schwarz criterion	-4.122602
Log likelihood	223.2937	F-statistic	23.43084
Durbin-Watson stat	2.100036	Prob(F-statistic)	0.000000

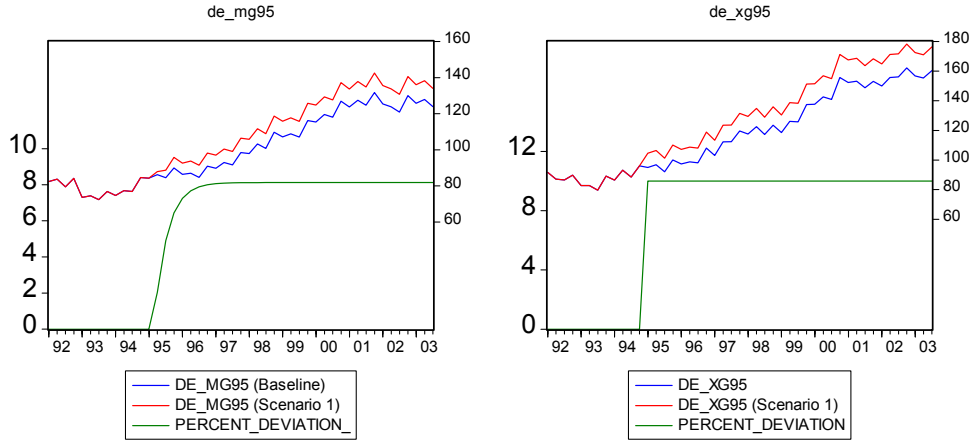
Germany's import of goods is explained by those components of total demand which strongly depend on imported inputs (export of goods (xg95) and gross fixed capital formation (ifc95)) and the relative import price (prel) which is calculated as follows: Price of import of goods (ESVG)/final demand deflator*100. Private consumption, which is also a major part of total demand turned out not to be part of the cointegration relationship, but the influence of private consumption on the import of goods is reflected by the lagged real disposable income (dispy95) which contributes to the short-run adjustment. Furthermore, the lagged demand components play a role for the short run adjustment. The impulse dummy d (S9301) catches an outlier in the first quarter 1993, which is due to the start of the European Common Market.

Residual tests	***Probability***	***Forecast evaluation***	
Normality test (Jarque-Bera)	0.651476	Root Mean Squared Error	1.693661
Serial Correlation LM test (lag 1)	0.565567	Mean Absolute Percent Error	0.014073
Serial Correlation LM test (lag 4)	0.444883	Theil inequality coefficient	0.000079
White's heteroscedasticity test	0.216756	Bias proportion	0.005934
RESET test (No. of fitted terms:1)	0.315072	Variance proportion	0.993987
ARCH LM test (lag 1)	0.287256	Covariance proportion	
ARCH LM test (lag 4)	0.434370		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

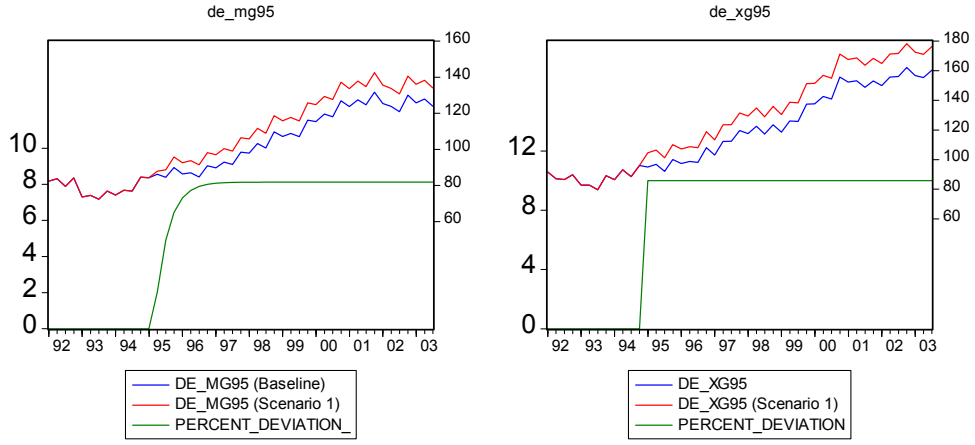
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation

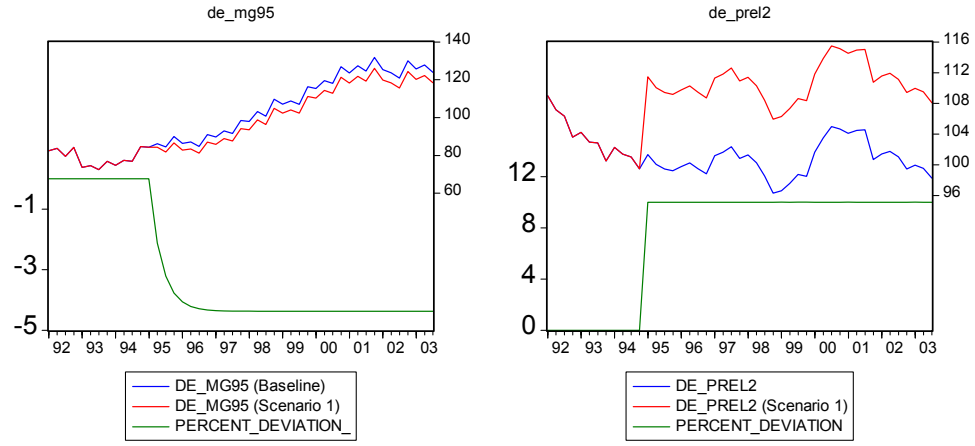
10% increase in German export of goods



10 % increase in gross fixed capital formation



10% increase in relative import price



German import of services (at constant prices of 1995)

Dependent Variable: DLOG(DE_MS95)
Method: Least Squares
Date: 12/06/04 Time: 17:45
Sample(adjusted): 1981Q1 2004Q3
Included observations: 95 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.861835	0.370943	-2.323360	0.0226
Z1	0.030949	0.022523	1.374137	0.1731
Z2	0.025238	0.023241	1.085931	0.2807
Z3	0.038674	0.023014	1.680445	0.0966
LOG(DE_MS95(-1))	**-0.071611**	**0.033264**	**-2.152820**	**0.0342**
LOG(DE_DISPY95(-1))	**0.203153**	**0.082638**	**2.458351**	**0.0160**
S9101	**-0.044420**	**0.025989**	**-1.709204**	**0.0911**
DLOG(DE_MS95(-1))	-0.346416	0.093046	-3.723076	0.0004
DLOG(DE_MS95(-2))	-0.409144	0.096088	-4.258031	0.0001
DLOG(DE_MS95(-3))	-0.369946	0.099626	-3.713366	0.0004
DLOG(DE_MS95(-4))	0.365038	0.099829	3.656622	0.0004
DLOG(DE_DISPY95(-3))	0.276181	0.160260	1.723332	0.0886

R-squared	0.950692	Mean dependent var	0.010054
Adjusted R-squared	0.944158	S.D. dependent var	0.143459
S.E. of regression	0.033901	Akaike info criterion	-3.813165
Sum squared resid	0.095389	Schwarz criterion	-3.490570
Log likelihood	193.1253	F-statistic	145.4828
Durbin-Watson stat	2.301398	Prob(F-statistic)	0.000000

A big part of German imports of services are due to tourism (German tourists abroad). Therefore, German import of services depends on real disposable income. The cointegration relationship is between import of services and disposable income. A relative price, however, turned out not to be significant. In the short-run import of services depends on its own lagged realizations and lagged income. The shift dummy s9101 accounts for effects due to the German unification.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.164192	Root Mean Squared Error	1.507303
Serial Correlation LM test (lag 1)	0.007600	Mean Absolute Percent Error	4.090775
Serial Correlation LM test (lag 4)	0.008927	Theil inequality coefficient	0.032906
White's heteroscedasticity test	0.069370	Bias proportion	0.027457
RESET test (No. of fitted terms:1)	0.424621	Variance proportion	0.155689
ARCH LM test (lag 1)	0.540041	Covariance proportion	0.816854
ARCH LM test (lag 4)	0.604555		
Stability tests			
CUSUM test	0		
CUSUM sq. test	1993:1-1999:4		

A.6. Trend of GDP and Capacity Utilization

Trend of Gross Domestic Product (at constant prices of 1995)

Dependent Variable: DE_GDP95T
Method: Least Squares
Date: 05/29/04 Time: 17:06
Sample(adjusted): 1980:1 2003:4
Included observations: 96 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	206.6991	5.401208	38.26904	0.0000
@TREND(1970:1)	1.810432	0.086025	21.04550	0.0000
S9101*@TREND(1970:1)	-0.171183	0.108959	-1.571074	0.1198
S9101	78.06851	9.154076	8.528279	0.0000
Z1	-21.55144	3.088521	-6.977915	0.0000
Z2	-11.86104	3.082527	-3.847831	0.0002
Z3	-10.61515	3.078881	-3.447730	0.0009
Z1*S9101	3.569444	4.194553	0.850971	0.3971
Z2*S9101	4.608657	4.187474	1.100582	0.2741
Z3*S9101	10.31608	4.183163	2.466097	0.0156

R-squared	0.992232	Mean dependent var	397.2458
Adjusted R-squared	0.991419	S.D. dependent var	77.91717
S.E. of regression	7.217814	Akaike info criterion	6.889314
Sum squared resid	4480.328	Schwarz criterion	7.156433
Log likelihood	-320.6871	F-statistic	1220.532
Durbin-Watson stat	0.422532	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.042382	Root Mean Squared Error	4.738984
Serial Correlation LM test (lag 1)	0.000000	Mean Absolute Percent Error	0.007229
Serial Correlation LM test (lag 4)	0.000000	Theil inequality coefficient	0.000000
White's heteroscedasticity test	0.001789	Bias proportion	0.001546
RESET test (No. of fitted terms:1)	0.000451	Variance proportion	0.998454
ARCH LM test (lag 1)	0.000383	Covariance proportion	
ARCH LM test (lag 4)	0.027772		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Definitions

de_capa = (de_gdp95 / de_gdp95t) * 100

de_prel = (de_pm / ((de_gdp – de_m) / (de_gdp95 – de_m95))*100

B. Prices, Exchange Rates and Interest Rates

B.1 Price Index: Private Consumption

Price Index: Private consumption expenditure (1995=100)

Dependent Variable: DLOG(DE_PC)
Method: Least Squares
Date: 05/29/04 Time: 17:12
Sample(adjusted): 1982:1 2003:4
Included observations: 88 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_PC(-1))	**-0.130361**	**0.018328**	**-7.112625**	**0.0000**
LOG(DE_ULC(-1))	**0.040378**	**0.010256**	**3.936995**	**0.0002**
LOG(DE_PM(-1)*@TREND(1970:1))	**0.037663**	**0.005817**	**6.474840**	**0.0000**
C	0.091433	0.014840	6.161109	0.0000
Z1	-0.024005	0.005877	-4.084740	0.0001
Z2	-0.011078	0.003538	-3.131257	0.0025
Z3	-0.014813	0.004816	-3.075524	0.0030
I9101	-0.021920	0.002688	-8.154595	0.0000
I9101(-4)	0.022457	0.003167	7.091126	0.0000
I8502	-0.010019	0.002849	-3.517372	0.0008
DLOG(DE_PC(-1))+DLOG(DE_PC(-3))-DLOG(DE_PC(-7))	-0.121623	0.032200	-3.777123	0.0003
DLOG(DE_PC(-2))-DLOG(DE_PC(-6))	-0.273344	0.047258	-5.784062	0.0000
DLOG(DE_PC(-4))	0.620763	0.047577	13.04759	0.0000
DLOG(DE_ULC(-1))-DLOG(DE_ULC(-5))	-0.100209	0.020284	-4.940416	0.0000
DLOG(DE_ULC(-3))-DLOG(DE_ULC(-4))	0.051280	0.014036	3.653465	0.0005
DLOG(DE_PM)	0.109654	0.018602	5.894870	0.0000
DLOG(DE_PM(-1))+DLOG(DE_PM(-2))-DLOG(DE_PM(-4))	0.049774	0.011318	4.397759	0.0000
D(DE_RS3M(-6))-D(DE_RS3M(-7))	0.001841	0.000449	4.097624	0.0001

R-squared	0.907634	Mean dependent var	0.004634
Adjusted R-squared	0.885202	S.D. dependent var	0.007455
S.E. of regression	0.002526	Akaike info criterion	-8.944111
Sum squared resid	0.000447	Schwarz criterion	-8.437383
Log likelihood	411.5409	F-statistic	40.46185
Durbin-Watson stat	2.097876	Prob(F-statistic)	0.000000

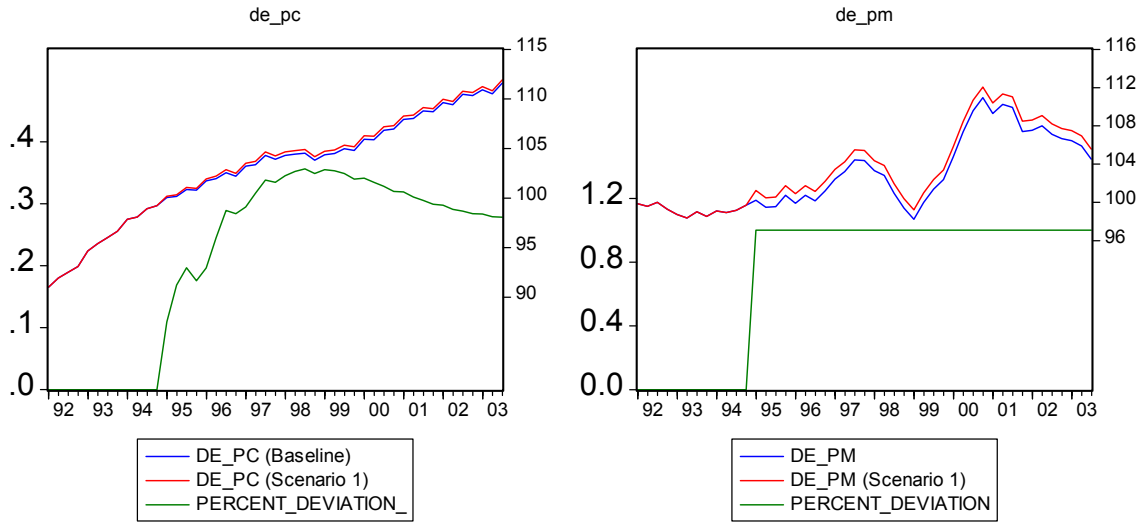
In the long run, consumer prices depend on unit labour costs and import prices. The influence of price on the consumer price index increases in accordance with the growing share of imported consumer goods in overall consumer goods. In the short run nominal short term interest rates have a positive impact on consumer prices.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.419822	Root Mean Squared Error	0.390357
Serial Correlation LM test (lag 1)	0.552269	Mean Absolute Percent Error	0.360001
Serial Correlation LM test (lag 4)	0.723814	Theil inequality coefficient	0.002075
White's heteroscedasticity test	0.742852	Bias proportion	0.000061
RESET test (No. of fitted terms:1)	0.074344	Variance proportion	0.013343
ARCH LM test (lag 1)	0.776903	Covariance proportion	0.986596
ARCH LM test (lag 4)	0.960384		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

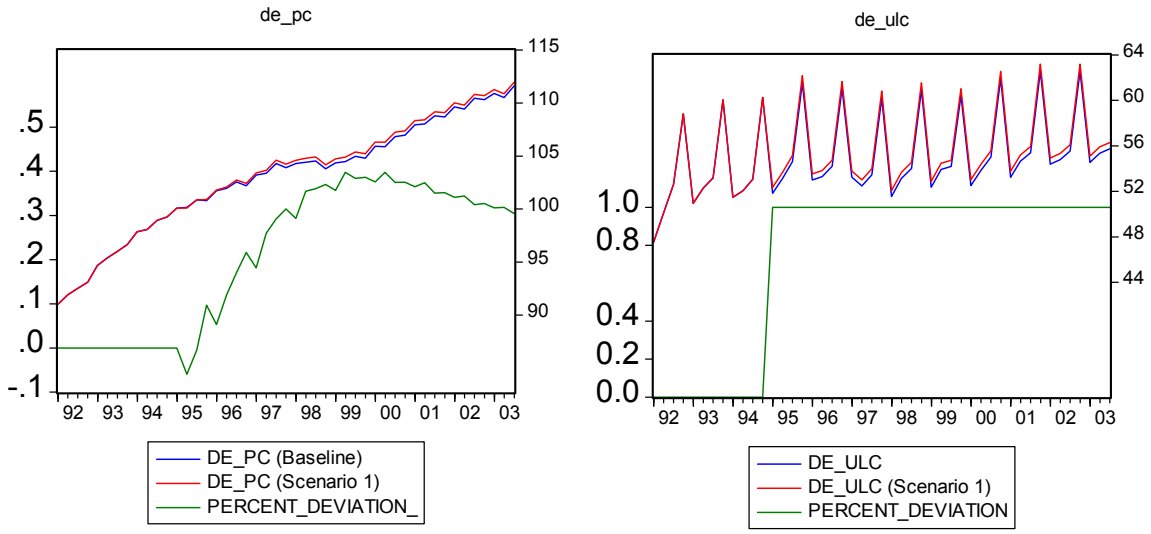
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation

1% permanent increase in import prices



1% permanent increase in unit labour costs



B.2. Price Index: Imports

Dependent Variable: DLOG(DE_PM)
Method: Least Squares
Date: 09/21/04 Time: 15:45
Sample(adjusted): 1981Q2 2003Q4
Included observations: 91 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_PM(-1))	**-0.394701**	**0.068632**	**-5.751020**	**0.0000**
LOG(DE_PGESDEF(-1))	**0.269126**	**0.068298**	**3.940470**	**0.0002**
(domestic price level = PTM coefficient)				
LOG(DE_PGESDEF(-1)/DE_RAW_19(-1))	**0.074658**	**0.044722**	**1.669382**	**0.0992**
(foreign price level)				
LOG(OIL$(-1)/DE_NAW_US(-1))	**0.034698**	**0.006068**	**5.718436**	**0.0000**
@TREND(1970:1)	**-0.001067**	**0.000377**	**-2.831994**	**0.0059**
C	0.752838	0.253751	2.966838	0.0040
Z1	-0.022034	0.004103	-5.369759	0.0000
Z2	0.004602	0.003463	1.328836	0.1879
Z3	-0.014699	0.003682	-3.992180	0.0002
DLOG(DE_PM(-4))	0.385610	0.069753	5.528213	0.0000
DLOG(DE_PGESDEF(-1)/DE_RAW_19(-1))	0.385286	0.067313	5.723780	0.0000
DLOG(DE_PGESDEF(-3)/DE_RAW_19(-3))	0.156270	0.061521	2.540100	0.0132
DLOG(DE_PGESDEF(-4)/DE_RAW_19(-4))	-0.206064	0.068900	-2.990762	0.0038
DLOG(OIL$(-0)/DE_NAW_US(-0))	0.041551	0.007074	5.874045	0.0000
I8702	0.028975	0.010325	2.806216	0.0064
I9201	-0.015407	0.009578	-1.608592	0.1119

R-squared	0.793547	Mean dependent var	0.000909
Adjusted R-squared	0.752256	S.D. dependent var	0.017620
S.E. of regression	0.008770	Akaike info criterion	-6.476614
Sum squared resid	0.005769	Schwarz criterion	-6.035144
Log likelihood	310.6859	F-statistic	19.21855
Durbin-Watson stat	1.871917	Prob(F-statistic)	0.000000

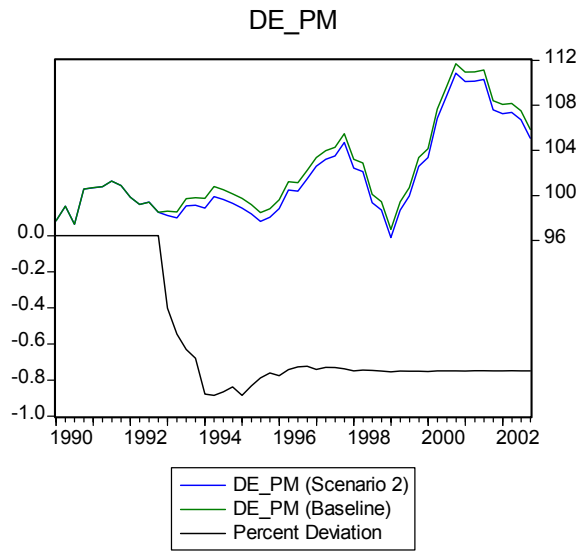
German import prices are modeled according to the theory of pricing-to-market (For a survey see Menon 1995; for the case of Germany see Clostermann 1996, Warmedinger 2004). Under imperfect competition, firms are no longer price-takers but they can set prices to a certain extent. I.e. they charge a price which covers not only the production costs but also includes a mark-up. This mark-up is not constant but depends on the intensity of competition on the respective market. Consequently, foreign exporters set their prices (which are the German import prices) not only with regard to their production costs (= foreign price level) but also to the domestic price level in the importing country (= Germany), which is typically a producer of those kind of goods which are imported. The so-called pricing-to market (= PTM) coefficient (which is the coefficient of the variable that reflects the domestic price level) measures, to what extent foreign exporters take the price level of competing firms in the importing country into account. The estimated PTM coefficient is about 0.7, indicating that the foreign exporters set their prices primarily with regard to the competing firms' prices and not to their own production costs. This result mirrors that the German market is higly competitive. Besides the foreign and the domestic price level, the oil price (in Euro) is also part of the cointegration relationship.

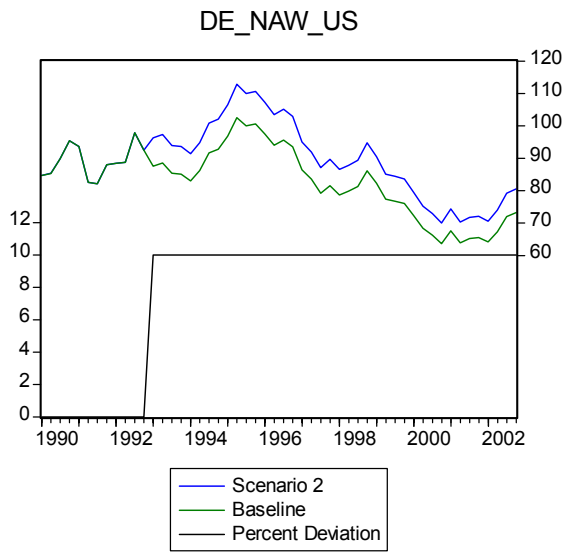
Residual tests	**Probability**	**Forecast evaluation (dynamic in-sample)**	
Normality test (Jarque-Bera)	0.46	Root mean squared error	1.28
Serial Correlation LM test (lag 1)	0.44	Mean absolute percent error	0.99
Serial Correlation LM test (lag 4)	0.67	Theil inequality coefficient	0.006
White's heteroscedasticity test	0.36	Bias proportion	0.00
ARCH LM test (lag 1)	0.74	Variance proportion	0.05
		Covariance proportion	0.95
Stability tests			
Reset test (no. of fitted terms: 1)	0.30		
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

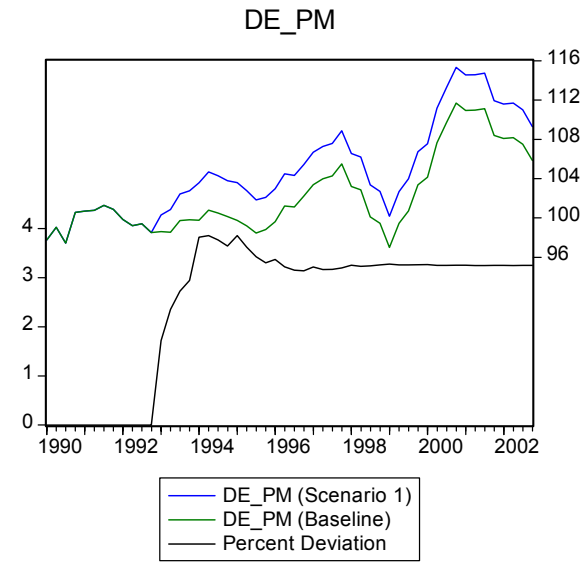
Simulation property of the equation

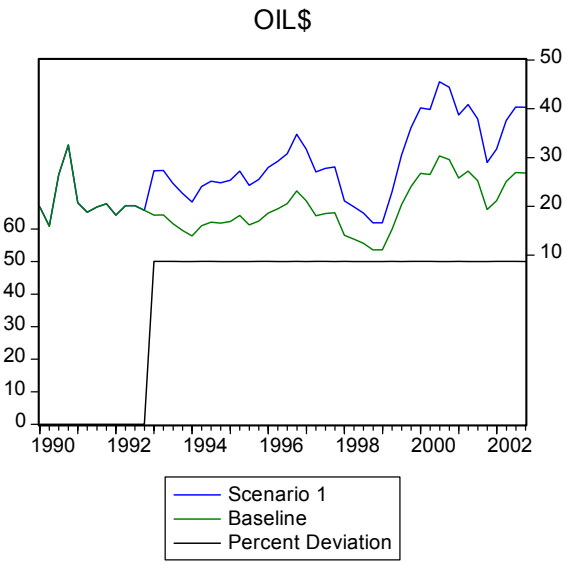
10% depreciation of the US-dollar





50% increase of the oil price





B.3. Price Index: Exports

Dependent Variable: DLOG(DE_PX) eq_de_px_1
Method: Least Squares
Date: 06/04/04 Time: 20:04
Sample: 1986Q1 2003Q4
Included observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_PX(-1))	**-0.259742**	**0.056595**	**-4.589487**	**0.0000**
LOG(DE_PGESDEF(-1))	**0.088804**	**0.023354**	**3.802578**	**0.0003**
LOG(DE_PM(-1))	**0.085115**	**0.019239**	**4.424190**	**0.0000**
C	0.395852	0.096336	4.109090	0.0001
Z1	-0.003341	0.000988	-3.381556	0.0013
Z2	0.004952	0.001266	3.912213	0.0002
Z3	-0.002063	0.001637	-1.260235	0.2126
DLOG(DE_PX(-1))	0.191966	0.072863	2.634608	0.0108
DLOG(DE_PM(-0))	0.215201	0.025887	8.313166	0.0000
DLOG(DE_PM(-2))	0.057994	0.026019	2.228911	0.0297
DLOG(DE_PGESDEF(-2))	-0.184610	0.065834	-2.804177	0.0069
I0103	-0.017675	0.002865	-6.170047	0.0000
I0104	0.018189	0.003225	5.640778	0.0000
I9001	-0.007511	0.002727	-2.754722	0.0078

R-squared	0.850950	Mean dependent var	0.001524
Adjusted R-squared	0.817543	S.D. dependent var	0.005983
S.E. of regression	0.002556	Akaike info criterion	-8.928333
Sum squared resid	0.000379	Schwarz criterion	-8.485648
Log likelihood	335.4200	F-statistic	25.47170
Durbin-Watson stat	2.033883	Prob(F-statistic)	0.000000

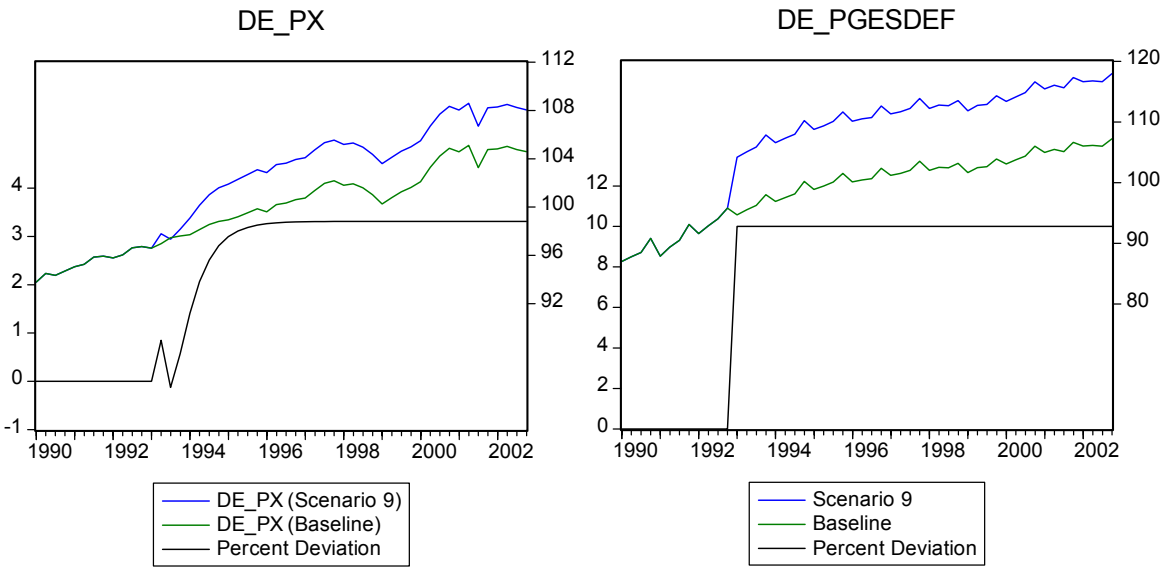
The export prices are determined by production costs which have a domestic (domestic price level) and a foreign (import prices) component. According to the estimated coefficients both components have roughly the same influence on export prices.

Residual tests	**Probability**	**Forecast evaluation (dynamic in-sample)**	
Normality test (Jarque-Bera)	0.80	Root mean squared error	0.33
Serial Correlation LM test (lag 1)	0.60	Mean absolute percent error	0.27
Serial Correlation LM test (lag 4)	0.89	Theil inequality coefficient	0.002
White's heteroscedasticity test	0.42	Bias proportion	0.0000
ARCH LM test (lag 1)	0.42	Variance proportion	0.0024
		Covariance proportion	0.9976
Stability tests			
Reset test (no. of fitted terms: 1)	0.49		
CUSUM test[a]	0		
$CUSUM^2$ test[a]	10		

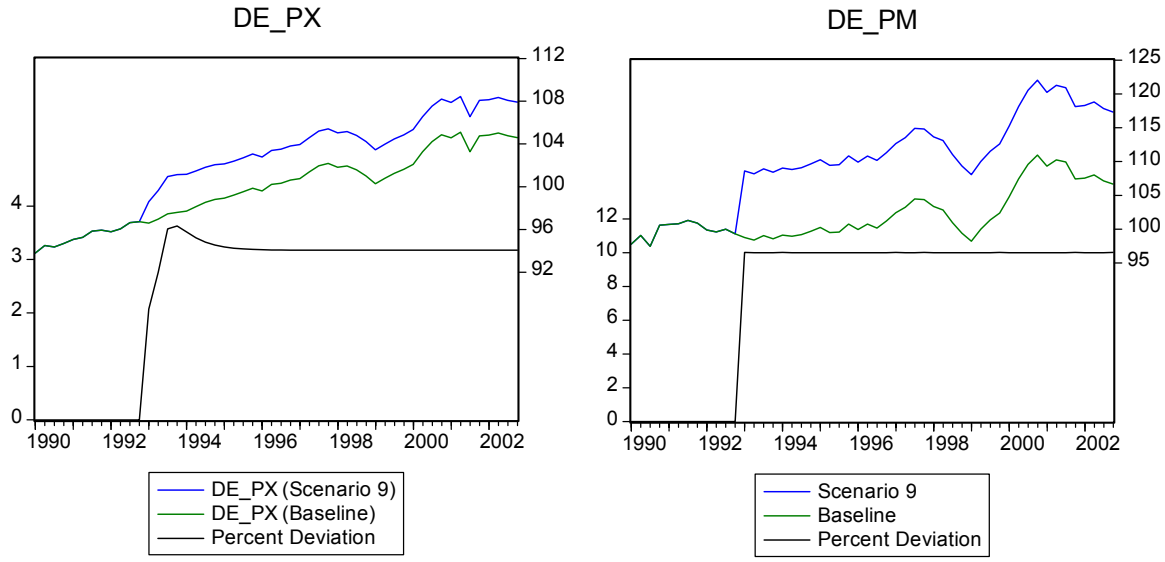
[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Simulation property of the equation

10% increase in domestic production costs



10% increase in import prices



B.4. Price Index: Government Expenditures and Overall Investment

Dependent Variable: DLOG(DE_PGI)
Method: Least Squares
Date: 05/30/04 Time: 19:20
Sample(adjusted): 1992:2 2003:4
Included observations: 47 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.537929	0.242250	2.220550	0.0324
Z1	-0.058293	0.012253	-4.757426	0.0000
Z2	0.003371	0.012628	0.266949	0.7910
Z3	-0.021178	0.005157	-4.106913	0.0002
LOG(DE_PGI(-1))	**-0.163777**	**0.074769**	**-2.190442**	**0.0347**
LOG(DE_GYEE(-1))	**0.039464**	**0.023050**	**1.712106**	**0.0950**
DLOG(DE_ULC(-1))	0.138632	0.069912	1.982959	0.0546
DLOG(DE_PGI(-4))	0.521485	0.097697	5.337798	0.0000
DLOG(DE_PM)	0.053810	0.069504	0.774195	0.4436

R-squared	0.986157	Mean dependent var	0.003447
Adjusted R-squared	0.983243	S.D. dependent var	0.038358
S.E. of regression	0.004965	Akaike info criterion	-7.602231
Sum squared resid	0.000937	Schwarz criterion	-7.247947
Log likelihood	187.6524	F-statistic	338.3858
Durbin-Watson stat	1.812841	Prob(F-statistic)	0.000000

At the moment a joint deflator for government consumption and overall investment is used in the model. Because of the high weight of wages in government consumption this variable is the only one in the cointegration relationsship. In the short run, unit labour costs and import prices have an impact on this deflator.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.541386	Root Mean Squared Error	0.788171
Serial Correlation LM test (lag 1)	0.637947	Mean Absolute Percent Error	0.629177
Serial Correlation LM test (lag 4)	0.490637	Theil inequality coefficient	0.003868
White's heteroscedasticity test	0.458263	Bias proportion	0.004044
RESET test (No. of fitted terms:1)	0.002279	Variance proportion	0.017317
ARCH LM test (lag 1)	0.376192	Covariance proportion	0.978638
ARCH LM test (lag 4)	0.566224		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Methodology of computation of the PGI: PGI = (CGOV+I)/(CGOV95+I95)*100

B.3. Spread of Interest Rates

Dependent Variable: DE_SPREAD
Method: Least Squares
Date: 05/29/04 Time: 17:14
Sample(adjusted): 1982:3 2003:4
Included observations: 86 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.622093	0.153135	4.062385	0.0001
DE_SPREAD(-1)	1.190565	0.095758	12.43308	0.0000
DE_SPREAD(-2)	-0.401965	0.091755	-4.380842	0.0000
DE_RS3M	-0.083311	0.023191	-3.592342	0.0006
DLOG(DE_ULC(-3))	0.650072	0.429741	1.512708	0.1343
D(US_SPREAD(-1))	0.120699	0.074145	1.627878	0.1075

R-squared	0.890203	Mean dependent var	0.869147
Adjusted R-squared	0.883340	S.D. dependent var	1.046533
S.E. of regression	0.357448	Akaike info criterion	0.847562
Sum squared resid	10.22154	Schwarz criterion	1.018795
Log likelihood	-30.44515	F-statistic	129.7230
Durbin-Watson stat	1.897890	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.541386	Root Mean Squared Error	0.788171
Serial Correlation LM test (lag 1)	0.637947	Mean Absolute Percent Error	0.629177
Serial Correlation LM test (lag 4)	0.490637	Theil inequality coefficient	0.003868
White's heteroscedasticity test	0.458263	Bias proportion	0.004044
RESET test (No. of fitted terms:1)	0.002279	Variance proportion	0.017317
ARCH LM test (lag 1)	0.376192	Covariance proportion	0.978638
ARCH LM test (lag 4)	0.566224		
Stability tests			
CUSUM test[a]	58 (1987:2-2003:4)		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

B.4. Real External Value of DM in Relation to the Currencies of the other EMU Members

$$REXVAL_{EMU} = \frac{CPI_{DE}}{CPI_{FR}} \times \frac{FFR}{DM} \times w_{FR} + \frac{CPI_{DE}}{CPI_{IT}} \times \frac{LIT}{DM} \times w_{IT} + \frac{CPI_{DE}}{CPI_{ES}} \times \frac{PTA}{DM} \times w_{PT}$$
$$+ \frac{CPI_{DE}}{CPI_{PT}} \times \frac{ESC}{DM} \times w_{ES} + \frac{CPI_{DE}}{CPI_{NL}} \times \frac{HFL}{DM} \times w_{NL} + \frac{CPI_{DE}}{CPI_{BE}} \times \frac{BFR}{DM} \times w_{BE}$$
$$+ \frac{CPI_{DE}}{CPI_{FI}} \times \frac{FMK}{DM} \times w_{FI} + \frac{CPI_{DE}}{CPI_{AT}} \times \frac{SHL}{DM} \times w_{AT} + \frac{CPI_{DE}}{CPI_{IE}} \times \frac{IPF}{DM} \times w_{IE}$$

$\frac{CPI_{DE}}{CPI_{FR}}$ = relative consumer prices Germany/France

$\frac{CPI_{DE}}{CPI_{IT}}$ = relative consumer prices Germany/Italy

$\vdots$

$\frac{FFR}{DM}$ = nominal external value of DM in relation to Franc

$\frac{LIT}{DM}$ = nominal external value of DM in relation to Lira

$\vdots$

w_{FR} = share of France in German exports

w_{IT} = share of Italy in German exports

$\vdots$

B.5. Real External Value of DM/Euro in Relation to British Pound

$$REXVAL_{UK} = \frac{CPI_{DE}}{CPI_{UK}} \times \frac{Pound}{DM}$$

B.6. Real External Value of DM/Euro in Relation to US-$

$$REXVAL_{US} = \frac{CPI_{DE}}{CPI_{US}} \times \frac{US\$}{DM}$$

Definitions

Gross Domestic Product
de_gdp = de_c*de_pc/100 + (de_cgov95 + de_i95)*de_pgi/100 +
de_x95*de_px/100 – de_m95*de_pm/100

GDP Deflator
de_pgdp = de_gdp/de_gdp95*100

Demand aggregates
de_iend95 = de_gdp95 + de_m95 - de_x95
de_end95 = de_gdp95 + de_m95

Unit labour costs
de_ulc = de_gyee / de_gdp95 * 100

Real unit labour costs
de_ulc95 = de_gyee / de_gdp * 100

Long-term interest rate
de_rl5y = de_rs3m + de_spread

Savings private households
de_log_s = log (de_dispy95) – log (de_c95)

C. Income and Employment

C.1. Consumption of Fixed Capital

Dependent Variable: DE_CFC
Method: Least Squares
Date: 02/09/05 Time: 17:38
Sample(adjusted): 1991:2 2003:4
Included observations: 51 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.959427	0.600125	4.931347	0.0000
Z1	-0.069142	0.202416	-0.341583	0.7343
Z2	0.561918	0.116512	4.822828	0.0000
Z3	0.003081	0.097802	0.031504	0.9750
.035*DE_K_IMEQ95(-1)*DE_PGI(-1)/100+.02*((DE_K_INRB95(-1)+DE_ID95(-1))*DE_PGI(-1)/100)+DE_IGOV(-1)*DE_PGI(-1)/100	0.025924	0.013577	1.909369	0.0627
DE_CFC(-1)	0.875908	0.052642	16.63890	0.0000
D(DE_CFC(-2))	0.154591	0.072105	2.143970	0.0376

R-squared	0.999170	Mean dependent var	69.38529
Adjusted R-squared	0.999057	S.D. dependent var	7.849405
S.E. of regression	0.241066	Akaike info criterion	0.119379
Sum squared resid	2.556956	Schwarz criterion	0.384531
Log likelihood	3.955838	F-statistic	8827.971
Durbin-Watson stat	1.737370	Prob(F-statistic)	0.000000

Consumption of fixed capital (cfc) or depreciation is estimated according to the calculation of cfc in the National Accounts Statistics. Therefore the stock of investment at current prices is used as the base to estimate the cfc.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.806294	Root Mean Squared Error	0.724856
Serial Correlation LM test (lag 1)	0.272003	Mean Absolute Percent Error	0.906597
Serial Correlation LM test (lag 4)	0.294902	Theil inequality coefficient	0.005181
White's heteroscedasticity test	0.008549	Bias proportion	0.093881
RESET test (No. of fitted terms:1)	0.082393	Variance proportion	0.300505
ARCH LM test (lag 1)	0.975940	Covariance proportion	0.605614
ARCH LM test (lag 4)	0.410199		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	26 (1996:2-2002:3)		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

C.2. Income

Gross wages (per person)

Dependent Variable: DLOG(DE_GWAGEE)
Method: Least Squares
Date: 05/31/04 Time: 15:22
Sample(adjusted): 1981:4 2003:4
Included observations: 89 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_GWAGEE95(-1))+0.3995*(DE_UR(-1))-0.5438*LOG(DE_PRODEE(-1))-3.5763+0.1361*Z1+0.1094*Z2+0.0896*Z3+0.0143*S9101(-1)	-0.142140	0.072236	-1.967701	0.0532
C	0.006666	0.001534	4.346366	0.0000
S9101	-0.005214	0.001418	-3.677985	0.0005
Z1	-0.162274	0.025260	-6.424175	0.0000
Z2	-0.030692	0.023514	-1.305267	0.1962
Z3	-0.043110	0.008096	-5.324584	0.0000
I9101	-0.175300	0.006429	-27.26566	0.0000
I8402	-0.037708	0.006556	-5.752015	0.0000
I9301	-0.023766	0.006878	-3.455537	0.0010
I9101(-1)	-0.021244	0.015354	-1.383607	0.1710
I9101(-2)	0.021881	0.007399	2.957310	0.0043
I9101(-3)	0.027221	0.006606	4.120791	0.0001
I9101(-4)	0.108549	0.014522	7.474691	0.0000
I9101(-5)	0.063798	0.014364	4.441521	0.0000
I9101(-6)	0.061291	0.011974	5.118687	0.0000
DLOG(DE_GWAGEE(-1))	-0.256917	0.082569	-3.111536	0.0027
DLOG(DE_GWAGEE(-4))	0.305968	0.067893	4.506615	0.0000
DLOG(DE_GWAGEE(-5))	0.359368	0.076675	4.686885	0.0000
DLOG(DE_PRODEE(-4))	0.199494	0.053244	3.746792	0.0004
DLOG(DE_PRODEE(-6))	0.174084	0.051893	3.354652	0.0013
DLOG(DE_PGDP(-5))	-0.289170	0.121511	-2.379777	0.0201

R-squared	0.997901	Mean dependent var	0.006754
Adjusted R-squared	0.997284	S.D. dependent var	0.114747
S.E. of regression	0.005980	Akaike info criterion	-7.198042
Sum squared resid	0.002432	Schwarz criterion	-6.610836
Log likelihood	341.3129	F-statistic	1616.725
Durbin-Watson stat	2.152819	Prob(F-statistic)	0.000000

In the long-run the gross wages per employees depends on prices, productivity and the unemployment rate: ln(gwage/ee) = ln(pgdp) +0,54*ln(prodee) –0,40*ur –0,01*S9101. The coefficients are quite in line with the literature (see e.g. McMorrow, 1996, Morgan/Mourougane, 2001 or van der Horst, 2002. But there are other studies finding much bigger effects ranging from –2 to –4: Tyrväinen, 1995 and Barrell/Dury, 2001).
This is a classical Wage-Setting function (Layard, Nickell, Jackman, 1991), where firms and employees bargain on the wages given resp. their profit and utility functions.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.530827	Root Mean Squared Error	67.49216
Serial Correlation LM test (lag 1)	0.192026	Mean Absolute Percent Error	0.870639
Serial Correlation LM test (lag 4)	0.398301	Theil inequality coefficient	0.006050
White's heteroscedasticity test	0.392196	Bias proportion	0.488841
RESET test (No. of fitted terms:1)	0.768227	Variance proportion	0.018708
ARCH LM test (lag 1)	0.502454	Covariance proportion	0.492451
ARCH LM test (lag 4)	0.320988		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Withdrawls from entrepreneurial income

Dependent Variable: DLOG(DE_WDYENT)
Method: Least Squares
Date: 05/29/04 Time: 17:15
Sample(adjusted): 1991:2 2003:4
Included observations: 51 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.982454	0.468633	2.096427	0.0418
Z1	0.195930	0.025147	7.791323	0.0000
Z2	0.006445	0.034149	0.188744	0.8512
Z3	-0.167414	0.028204	-5.935877	0.0000
LOG(DE_WDYENT(-1))	**-0.395978**	**0.127253**	**-3.111737**	**0.0033**
LOG(DE_NYPRO(-1))	**0.097690**	**0.081250**	**1.202332**	**0.2357**
@TREND(1970:1)	**0.002811**	**0.001265**	**2.222653**	**0.0314**

R-squared	0.958137	Mean dependent var	0.003477
Adjusted R-squared	0.952428	S.D. dependent var	0.148033
S.E. of regression	0.032288	Akaike info criterion	-3.901396
Sum squared resid	0.045869	Schwarz criterion	-3.636243
Log likelihood	106.4856	F-statistic	167.8400
Durbin-Watson stat	2.034450	Prob(F-statistic)	0.000000

The withdrawals from entrepreneurial income (and mixed income) are explained by net profits and a positive long-term trend.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.617949	Root Mean Squared Error	2.915398
Serial Correlation LM test (lag 1)	0.540185	Mean Absolute Percent Error	2.919579
Serial Correlation LM test (lag 4)	0.318260	Theil inequality coefficient	0.018277
White's heteroscedasticity test	0.391452	Bias proportion	0.007101
RESET test (No. of fitted terms:1)	0.804150	Variance proportion	0.028777
ARCH LM test (lag 1)	0.788379	Covariance proportion	0.964122
ARCH LM test (lag 4)	0.673135		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

C.3. Employment

Employees

(Domestic concept, in 1000)

Dependent Variable: DLOG(DE_EE)
Method: Least Squares
Date: 05/29/04 Time: 17:05
Sample(adjusted): 1981:2 2003:4
Included observations: 91 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(DE_EE(-1))	**-0.129290**	**0.021747**	**-5.945310**	**0.0000**
LOG(DE_GDP95(-1))	**0.056591**	**0.018404**	**3.074867**	**0.0030**
LOG(DE_GYEEE95(-1))	**-0.060384**	**0.032712**	**-1.845947**	**0.0690**
@TREND(1970:1)*(1-S9101)	9.90E-05	5.73E-05	1.727516	0.0884
S9101	0.030331	0.008921	3.399783	0.0011
C	1.508701	0.325422	4.636144	0.0000
Z1	-0.025663	0.004079	-6.291586	0.0000
Z2	9.18E-05	0.006036	0.015209	0.9879
Z3	-0.008597	0.002364	-3.637100	0.0005
I9101	0.289548	0.006579	44.01050	0.0000
I9001	0.016374	0.002723	6.012487	0.0000
I9101(-1)	-0.057579	0.023012	-2.502163	0.0146
I9101(-4)	-0.124151	0.025418	-4.884408	0.0000
DLOG(DE_GDP95(-3)+DE_GDP95(-4))	0.080997	0.032765	2.472058	0.0158
DLOG(DE_EE(-1)-DE_RES_EE(-1))	0.183981	0.070899	2.594993	0.0115
DLOG(DE_EE(-4)-DE_RES_EE(-4))	0.383280	0.078628	4.874591	0.0000
DLOG(DE_GYEEE95(-1))	0.063259	0.028078	2.253011	0.0273
DLOG(DE_GYEEE95(-2)+DE_GYEEE95(-3))	0.104432	0.033186	3.146856	0.0024
I8901	0.008452	0.002629	3.214408	0.0020

R-squared	0.995810	Mean dependent var	0.004094
Adjusted R-squared	0.994762	S.D. dependent var	0.033740
S.E. of regression	0.002442	Akaike info criterion	-9.008713
Sum squared resid	0.000429	Schwarz criterion	-8.484467
Log likelihood	428.8964	F-statistic	950.5800
Durbin-Watson stat	1.996014	Prob(F-statistic)	0.000000

In the long-run, employment depends on real GDP and real labour costs (gyeee95=gyee/ee*1/pgdp): ln(ee) = 0,43*ln(gdp95) –0,52*[ln(gyee/ee)-ln(pgdp)] + 0,00*trend(1980-1990) +0,25*S9101. The coefficients are significantly different from one; this result corresponds to the fact that the wage-share is non-stationary in the estimated period. Furthermore, this equation reflects the "right-to-manage" of firms (Layard, Nickell, Jackman, 1991), where firms determine the level of employment on their profit curve, once wages and demand are set. The German Bundesbank (Memmod, 2000) estimates a similar coefficient for the output (0,52), but a much higher coefficient (0,72) for the real wage. But they use other variables (employed persons, real final demand and real gross wages). However, it is important that their results confirm ours in the sense that a Cobb-Douglas restriction (1;-1) is rejected.

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.588498	Root Mean Squared Error	134.3938
Serial Correlation LM test (lag 1)	0.994842	Mean Absolute Percent Error	0.002854
Serial Correlation LM test (lag 4)	0.944109	Theil inequality coefficient	0.010206
White's heteroscedasticity test	0.324231	Bias proportion	0.052708
RESET test (No. of fitted terms:1)	0.352255	Variance proportion	0.937086
ARCH LM test (lag 1)	0.229248	Covariance proportion	
ARCH LM test (lag 4)	0.664783		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Self Employed Persons
(domestic concept, in 1000)

Dependent Variable: DLOG(DE_ES)
Method: Least Squares
Date: 05/29/04 Time: 17:05
Sample: 1980:1 2003:4
Included observations: 96

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.018348	0.003825	-4.797095	0.0000
LOG(@TREND(1970:1))	0.004440	0.000866	5.127611	0.0000
DLOG(DE_ES(-1))	0.140268	0.026302	5.332876	0.0000
I9101	0.105050	0.002886	36.39581	0.0000

R-squared	0.938009	Mean dependent var	0.002729
Adjusted R-squared	0.935987	S.D. dependent var	0.011348
S.E. of regression	0.002871	Akaike info criterion	-8.827394
Sum squared resid	0.000758	Schwarz criterion	-8.720546
Log likelihood	427.7149	F-statistic	464.0264
Durbin-Watson stat	1.138372	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.106669	Root Mean Squared Error	35.60105
Serial Correlation LM test (lag 1)	0.000005	Mean Absolute Percent Error	0.006384
Serial Correlation LM test (lag 4)	0.000227	Theil inequality coefficient	0.047971
White's heteroscedasticity test	0.074557	Bias proportion	0.347279
RESET test (No. of fitted terms:1)	0.000368	Variance proportion	0.604750
ARCH LM test (lag 1)	0.000193	Covariance proportion	
ARCH LM test (lag 4)	0.000915		
Stability tests			
CUSUM test[a]	0		
$CUSUM^2$ test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Unemployed Persons
(domestic concept, in 1000)

Dependent Variable: D(DE_U)
Method: Least Squares
Date: 05/29/04 Time: 17:15
Sample(adjusted): 1981:3 2003:4
Included observations: 90 after adjusting endpoints

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DE_U(-1)	**-0.086807**	**0.017827**	**-4.869465**	**0.0000**
DE_EE(-1)	**-0.019266**	**0.011890**	**-1.620379**	**0.1096**
C	678.0797	294.8161	2.300009	0.0244
S9101	348.7384	132.0646	2.640665	0.0102
I9101	301.6325	133.1939	2.264612	0.0266
Z2	-262.5943	72.64631	-3.614695	0.0006
Z1*S9101	138.2630	35.16079	3.932308	0.0002
D(DE_U(-1))	0.492451	0.070284	7.006624	0.0000
D(DE_U(-3))	-0.203047	0.042833	-4.740437	0.0000
D(DE_U(-4))	0.331153	0.069348	4.775232	0.0000
D(DE_U(-5))	-0.260863	0.076006	-3.432151	0.0010
D(DE_EE(-1))	-0.025211	0.007122	-3.540151	0.0007
D(DE_EE(-2))	0.023941	0.008988	2.663643	0.0096
D(DE_EE(-3))	0.018139	0.010204	1.777565	0.0798
D(DE_EE(-5))	0.020897	0.008653	2.415021	0.0183
DLOG(DE_GDP95(-2))	-874.7210	451.1950	-1.938676	0.0566
DLOG(DE_GDP95(-3))	-1738.164	537.9832	-3.230889	0.0019
DLOG(DE_GDP95(-4))	-2173.928	375.6184	-5.787596	0.0000
DLOG(DE_GDP95(-5))	-806.4246	484.5189	-1.664382	0.1005
I0301	185.9691	55.86922	3.328650	0.0014

R-squared	0.966948	Mean dependent var	33.97778
Adjusted R-squared	0.957976	S.D. dependent var	254.0681
S.E. of regression	52.08304	Akaike info criterion	10.93669
Sum squared resid	189885.0	Schwarz criterion	11.49220
Log likelihood	-472.1509	F-statistic	107.7822
Durbin-Watson stat	1.929980	Prob(F-statistic)	0.000000

Residual tests	***Probability***	***Forecast evaluation (dynamic in-sample)***	
Normality test (Jarque-Bera)	0.938231	Root Mean Squared Error	117.0812
Serial Correlation LM test (lag 1)	0.682852	Mean Absolute Percent Error	2.627395
Serial Correlation LM test (lag 4)	0.652991	Theil inequality coefficient	0.018210
White's heteroscedasticity test	0.373233	Bias proportion	0.000051
RESET test (No. of fitted terms:1)	0.100196	Variance proportion	0.003500
ARCH LM test (lag 1)	0.703764	Covariance proportion	0.996449
ARCH LM test (lag 4)	0.297974		
Stability tests			
CUSUM test[a]	0		
CUSUM^2 test[a]	0		

[a] Number of quarters where the cumulative sum goes outside the area between the 5% critical lines.

Definitions

Disposable income of private households
de_dispy = de_nwage + de_trfgov + de_wdyent

National Income
de_y = de_gdp – de_tind – de_cfc

Real labour costs
de_gyeee95 = de_gyee/de_ee*1/de_pgdp

Total employment
De_et = de_ee + de_es

Productivity /per emplyee)
de_prodee = de_gdp95/de_ee

III. Documentation

A. Variables and Data Sources

Variablenname

DE_BGOV	Finanzierungssaldo Staat	Net lending, general government
DE_C	Private Konsumausgaben	Private consumption expenditure
DE_C95	Private Konsumausgaben;zu konst.Preisen	Private consumption expenditure;at const. prices
DE_CAPA	Gesamtwirtschaftl.Kapazitätsauslastung	Capacity utilisation,total economy
DE_CDAX	CDAX	Index of German stock market
DE_CFC	Abschreibungen	Consumption of fixed capital
DE_CFCGOV	Abschreibungen,Staat	Consumption of fixed capital – government
DE_CGOV	Konsumausgaben des Staates	Government consumption
DE_CGOV95	Konsumausgaben des Staates;zu konst.Preisen	Government consumption;at const. Prices
DE_DBTGOV	Schuldenstand des Staates	Public debt stock
DE_DISPY	Verfügbares Einkommen private Haushalte(Ausg.konz.)	Disposable income, households
DE_DISPY95	Verfügbares Einkommen private Haushalte;zu konst.Preisen	Disposable income, households;at constant prices
DE_EE	Arbeitnehmer im Inland	Employees (domestic concept)
DE_END95	Endnachfrage; zu konst. Preisen	Final demand;at constant prices
DE_ES	Selbständige	Self employed persons
DE_ET	Erwerbstätige im Inland	Persons engaged (domestic concept)
DE_EXPGOV	Staatsausgaben	Goverment expenditures
DE_GDP	Bruttoinlandsprodukt	Gross domestic product
DE_GDP95	Bruttoinlandsprodukt;zu konst.Preisen	Gross domestic product at constant prices
DE_GNP	Bruttonationaleinkommen (=BSP)	Gross national income(=GNP)
DE_GNP95	Bruttonationaleinkommen (=BSP);zu konst.Preisen	Gross national income(=GNP) at constant prices
DE_GWAGE	Bruttolohn-und-gehaltsumme,Inländerkonzept	Wages and saleries, gross - resident concept
DE_GYEE	Arbeitnehmerentgelte,Inlandskonzept	Compensation of employees, domestic concept
DE_GYEEE95	Reale Arbeitskosten je Beschäftigte	Total labours costs (real)
DE_GYPROP	Unternehmens- u.Vermögenseinkommen(brutto)	Operating surplus and mixed income (gross)
DE_ICON	Bruttoanlageinvestionen,Bauten	Gross fixed capital formation;construction
DE_ICON95	Bruttoanlageinvestionen,Bauten;zu konst.Preisen	Gross fixed capital formation;construction;at const. Prices
DE_ICONGOV	Bruttoanlageinvestionen,Bauten,Staat	Gross fixed capital formation;construction;government
DE_ICONGOV95	Bruttoanlageinvestionen,Bauten,Staat;zu konst.Preisen	Gross fixed capital formation;construction;government;at const. prices
DE_ID	Wohnbauten,priv. Haush. u. Kapitalgesellsch.	Residential buildings; households and inc. firms
DE_ID95	Wohnbauten,priv. Haush. u. Kapitalgesellsch.;zu konst.Preisen	Residential buildings;households and inc. firms;at const. prices
DE_IEND95	Gesamtnachfrage;zu konst.Preisen	Total demand;at const. Prices
DE_IFC	Bruttoanlageinvestionen	Gross fixed capital formation;price index(1995=100)
DE_IFC95	Bruttoanlageinvestionen;zu konst.Preisen	Gross fixed capital formation;at

		const. Prices
DE_IFC95_EU7	Index der Investitionsnachfrage aus der EWU (EU7)	Investment activity in the EU7-countries(Index; 1995=100)
DE_IFCGOV	Bruttoanlageinvestionen,Staat	Gross fixed capital formation
DE_IGOV	Bruttoinvestitionen,Staat	Gross investment;government
DE_IMEQ95	Ausrüstungen;zu konst.Preisen	Equipment;at const. prices
DE_INRB	Nichtwohnbauten,priv. Haush. u. Kapitalgesellsch.	Non-residential buildings
DE_INRB95	Nichtwohnbauten,priv. Haush. u. Kapitalgesellsch.;zu konst.Preisen	Non-residential buildings;at const. prices
DE_INTPAGOV	Vermögenseinkommen des Staates,geleistet (Zinsen)	Income from property, government; (interest),paid
DE_IOTH95	Sonstige Anlagen;zu konst.Preisen	Other fixed capital formation;at const. Prices
DE_IS	Vorratsveränd.u.Nettozug.an Werts.	Change in stocks and net additions to valuables
DE_IS95	Vorratsveränd.u.Nettozug.an Werts.;zu konst.Preisen	Change in stocks and net additions to valuables ;at const. prices
DE_M	Einfuhr	Imports
DE_M95	Einfuhr;zu konst.Preisen	Imports;at const. prices
DE_MG	Einfuhr,Waren	Imports,goods
DE_MG95	Einfuhr,Waren;zu konst.Preisen	Imports,goods;at const. prices
DE_MS	Einfuhr,Dienstleistungen	Imports,services
DE_MS95	Einfuhr,Dienstleistungen;zu konst.Preisen	Imports,services;at const. prices
DE_NETPRGOV	Nettozugang an nicht-produzierten Vermögensgütern (Staat)	
DE_NIGOV	Nettoinvestitionen des Staates	Public net investement
DE_NWAGE	Nettolohn-und -gehaltsumme	Net wages and salaries
DE_PAIDDAYS	Arbeitstage, bezahlt	Working days of employees, paid
DE_PCGOV	Preisindex;Konsumausgaben des Staates	Price index;government consumption (1995=100)
DE_PEX	Preisindex;Ausfuhr	Price index;exports (1995=100)
DE_PGDP	Preisindex;Bruttoinlandsprodukt	Price index;Gross domestic product (1995=100)
DE_PGI	Preisindex Staatsverbrauch + Investitionen	Price index government consumption + investment (1995=100)
DE_PGNP	Preisindex;Bruttonationaleinkommen (=BSP)	Price index;Gross national income(=GNP) (1995=100)
DE_PICON	Preisindex;Bruttoanlageinvestionen,Bauten	Price index;gross fixed capital formation;construction (1995=100)
DE_PID	Preisindex;Bauinvestitionen	Price index;Investement : dwellings (1995=100)
DE_PIMEQ	Preisindex;Ausrüstungen	Price index;equipment (1995=100)
DE_PINRB	Preisindex;Nichtwohnbauten,priv. Haush. u. Kapitalgesellsch.	Price index;non-residential buildings;households and inc. Firms (1995=100)
DE_PM	Preisindex;Einfuhr	Price index;imports (1995=100)
DE_PMG	Preisindex;Einfuhr,Waren	Price index;imports,goods (1995=100)
DE_PMS	Preisindex;Einfuhr,Dienstleistungen	Price index; imports,services(1995=100)
DE_PREL	Relativer Importpreis	Relative import price
DE_PRODEE	Produktivität (je abh. Erwerbstätigen)	Productivity (per employee)
DE_PROTRGOV	Vermögenstransfers Staat an and.Sektoren	Capital transfers,government to other sectors
DE_PX	Preisindex;Ausfuhr	Price index;exports (1995=100)
DE_PXG	Preisindex;Ausfuhr,Waren	Price index;exports,goods (1995=100)
DE_PXS	Preisindex;Ausfuhr,Dienstleistungen	Price index;exports,services (1995=100)

DE_RAW_EWU	real. Außenwert der DM gegenüber den Währ. der EWU	Real external value of the Deutsche Mark in rel. to the curr. of the EMU memb. countr.
DE_RAW_UK	realer Außenwert der DM/des Euro gegenüber brit. Pfund	Real external value of the EURO in rel. to the brit. Pound
DE_RAW_US	realer Außenwert der DM/des Euro gegenüber dem US Dollar	Real external value of the EURO in rel. to the US-Dollar
DE_RECPROTR	Vermögenstransfers Staat von and.Sektoren	Capital transfers,government from other sectors
DE_REVGOV	Staatseinnahmen	Goverment revenues
DE_REVYTRF	Sonst.lauf.Transfers Staat von and.Sekt.	Other current transfers,government from other sectors
DE_RL5Y	Kapitalmarktzinsen (5 Jahre)	Long term interest rate (5 years)
DE_RS3M	Geldmarktzinsen (3 Monate)	Short term interest rate (3 months)
DE_S	Ersparnisse pr. Haushalte	Savings privat households
DE_SALESSUB	Verkäufe+Sonstige Subventionen des Staates	
DE_SPREAD	Zinsspread	Spread interest rates
DE_SUBGOV	Subventionen vom Staat	Subsidies from government
DE_T	Steuern Staat von and.Sekt.	Taxes , government from other sectors
DE_TDIR	Direkte Steuern	Direct taxes
DE_TDIREE	Eink.-u.Verm.st.,Lohnst.der AN (Inländerkonzept)	Current taxes on income,wealth – taxes on wages and salaries; (resident concept)
DE_TDIREM	Eink.-u.Verm.st.,Arb.geber-u.Verm.st.,pr.HH an Staat	Current taxes on income,wealth – employer's and income taxes ; households to government
DE_TIND	Produktions-und Importabgaben	Levy on production and import
DE_TREND9302	Trend (ab 2.Quartal 1993)	Trend (since 1993, 2.quarter)
DE_TRFGOV	Monetäre u.ä. Transfers,Staat an and.Sekt.	Monetary transfers, government to other sectors
DE_TRSONGOV	Sonst.lauf.Transfers Staat an and.Sekt.	Other current transfers,government to other sectors
DE_TSS	Sozialbeiträge Staat von and.Sektoren	Social contribution government from other sectors
DE_TSSEE	Tats.Soz.beitr.,AN.beitr.	Actual social contributions, employee contribution
DE_TSSEE_TARIFF	Tarife zur Sozialversicherung (effektiv)	Tariff social security (effective)
DE_TSSEE_TARIFFSA	Tarife zur Sozialversicherung (effektiv), saisonber.	Tariff social security (effective), seasonal adjusted
DE_TSSEM	Beiträge der Arbeitgeber zur Sozialversicherung	Social security contribution of employers
DE_U	Arbeitslose	Unemployed persons
DE_ULC	Lohnstückkosten,Inlandskonzept (ber.)	Unit labour costs,domestic concept(adj.)
DE_W	kumulierte Ersparnisse (Vermögen)	Cumulated savings private households (wealth)
DE_WDYENT	Verteilte Gewinne	Withdrawls from entrepreneurial income
DE_X	Ausfuhr	Exports
DE_X95	Ausfuhr;zu konst.Preisen	Exports;at const. prices
DE_XG	Ausfuhr,Waren	Exports,goods
DE_XG_EWU	deutsche Warenexporte in die EWU	German exports to the EMU
DE_XG_ROW	deutsche Warenexporte in den Rest der Welt	German exports to the rest of the world
DE_XG_UK	deutsche Warenexporte nach UK	German exports to UK
DE_XG_US	deutsche Warenexporte in die USA	German exports to USA
DE_XG95	Ausfuhr,Waren;zu konst.Preisen	Exports,goods;at const. prices

DE_XG95_EWU	deutsche Warenexporte in die EWU;zu konst.Preisen	German exports to the EMU; at const. Prices
DE_XG95_ROW	deutsche Warenexporte in den Rest der Welt;zu konst.Preisen	German exports to the rest of the world; at const. prices
DE_XG95_UK	deutsche Warenexporte nach UK;zu konst.Preisen	German exports to UK; at const. Prices
DE_XG95_US	deutsche Warenexporte in die USA;zu konst.Preisen	German exports to USA; at const. Prices
DE_XM	Außenbeitrag	Balances of exports and imports of goods and services
DE_XM95	Außenbeitrag;zu konst.Preisen	Balances of exports and imports of goods and services;at const. prices
DE_XS	Ausfuhr,Dienstleistungen	Exports,services
DE_XS95	Ausfuhr,Dienstleistungen;zu konst.Preisen	Exports,services;at const. prices
DE_Y	Volkseinkommen	National income
DE_YPROGOV	Vermögenseinkommen des Staates,empfangen	Income from property, government; paid
DE_YTRF	Laufende Transfers private Haushalte (Saldo)	Current transfers households (account balance)
DE_YXM	Saldo der Einkommensübertr. zw. In-und Ausländern	Net income transfers
DE_YXM95	Saldo der Einkommensübertr. zw. In-und Ausländern; zu konst.Preisen	Net income transfers;at const. prices
EU7_IFC95	Bruttoanlageinvestition, real, EU7-Länder	Fixes capital investment at const. Prices (1995 =100) of EU7-countries
UK_GDP95	Index des reales BIP in UK (1995=100)	GDP (UK) at const. prices (1995=100)
UK_IFC95	Index der realen Bruttoanlageinvestitionen in UK (1995=100)	Gross fixed capital formation in UK;at const. prices (1995=100)
US_IFC95	Index der realen Bruttoanlageinvestitionen in US (1995=100)	Gross fixed capital formation in US;at const. prices (1995=100)
US_RL10Y	Kapitalmarktzinsen (10 Jahre) - USA	Long term interest rate (10 years) – USA
US_RL5Y	Kapitalmarktzinsen (5 Jahre) - USA	Long term interest rate (5 years) – USA
US_RS3M	Geldmarktzinsen (3 Monate) - USA	Short term interest rate (3 months) – USA

Dummies: Dummies:

DE_z1..... DE_z3	Saison-Dummies	seasonal dummies
DE_I001..... DE_I9904	Impuls_Dummies (Impuls jeweils im entsprechendem Jahr/Quartal)	
DE_S9101...DE_9701	Sprung-Dummies (Spung jeweils im entsprechendem Jahr/Quartal)	

Residuen: Residuals:

DE_RES_.....

B. Augmented Dickey-Fuller unit root Tests

B. Augmented Dickey-Fuller unit root Tests							
Sample 1980/91:1 – 2003:4	**Niveau**			**First Differences**			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(DE_C95)	C, trend z1 z2 z3, S9101	1-4	-1,87	C, z1 z2 z3, i9101	1-3	-7,33	I(1)
Log(DE_CFC)	C, trend z1 z2 z3, S9101	-	-2,23	C, z1 z2 z3, i9101	1-7	-5,02	I(1)
Log(DE_CFCGOV)	C	1-7****	-0,78	-	1	-3,03	I(1)
Log(DE_CGOV)	C, trend z1 z2 z3	1-7	-1,79	C, z1 z2 z3	1-3	-3,42	I(1)
Log(DE_CGOV95)	C, trend z1 z2 z3	1-4	-2,40	C, z1 z2 z3	1-7	-3,51	I(1)
Log(DE_DISPY)	C, trend z1 z2 z3, s9101	1-7	-0,70	C, z1 z2 z3, i9101	1-8	-5,39	I(1)
Log(DE_DISPY95)	C, trend z1 z2 z3, S9101	1-8	-1,99	C, z1 z2 z3, i9101	1-8	-5,82	I(1)
Log(DE_EE)	C, trend z1 z2 z3, s9101	1-5	-2,62	C, z1 z2 z3	-	-9,49	I(1)
Log(DE_END95)	C, trend, z1 z2 z3, s9101	1-4	-2,56	C, z1 z2 z3, i9101	1-3	-5,37	I(1)
Log(DE_ES)	C, trend, z1 z2 z3,s9101,s9101*trend	-	-3,06	C, z1 z2 z3	-	-7,93	I(1)
Log(DE_EXPGOV)	C, trend, z1 z2 z3	1	-2,51	-	-	-	Trendstationary
Log(DE_GDP)	C, trend, z1 z2 z3, s9101	1-8	-0,62	C, z1 z2 z3, i9101	1-3	-3,85	I(1)
Log(DE_GDP95)	C, trend, z1 z2 z3, s9101	1-8	-2,08	C, z1 z2 z3, i9101	1-3	-5,63	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
** Significant at 5% rejection level of the Dickey-Fuller Tests statistics
*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics
****Due to the failure of reduced equation to fit series lag length was selected according to Akaike IC.

Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(DE_GWAGE)	C, trend, z1 z2 z3,s9101	-	-2,13	C, z1 z2 z3, i9101	1-3	-5,67	I(1)
Log(DE_GYEE)	C, trend, z1 z2 z3, s9101	1	-1,5	C, z1 z2 z3	1-3	-5,10	I(1)
Log(DE_GYHEE)	C, trend, z1 z2 z3, s9101	1-3	-1,72	C, z1 z2 z3	1,2	-6,96	I(1)
Log(DE_GYPROP)	C, trend, z1 z2 z3, s9101	1-4	-1,17	C, z1 z2 z3	1-3	-5,93	I(1)
Log(DE_HWEE)	C, trend, z1 z2 z3, s9101	1-5	-2,64	C, z1 z2 z3	-	-10,67	I(1)
Log(DE_HWET)	C, trend, z1 z2 z3, s9101	1-3	-1,54	C, z1 z2 z3	1-3	-4,25	I(1)
Log(DE_ICON95)	C, trend, z1 z2 z3, s9101	1-4	-3,35	C, z1 z2 z3, i9101	1-3	-4,46	I(1)
Log(DE_ICONGOV95)	C, trend, z1 z2 z3, s9101	1-4	-1,75	C, z1 z2 z3	1-3	-4,99	I(1)
Log(DE_ID95)	C, trend, z1 z2 z3, s9101	1-4	-2,85	C, z1 z2 z3, i9101	1-3	-3,94	I(1)
Log(DE_IEND95)	C, trend, z1 z2 z3, s9101	1	-1,93	z1 z2 z3	1-3	-3,69	I(1)
Log(DE_IFC95)	C, trend, z1 z2 z3, s9101	1-4	-2,38	C, z1 z2 z3, i9101	1-3	-4,10	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
** Significant at 5% rejection level of the Dickey-Fuller Tests statistics
*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics
**** Rejects the hypothesis of $\gamma = 0$ under normal distribution. See Enders (1995), p. 257

Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(DE_IGOV)	C, trend, z1 z2 z3	4	-4,26	C, z1 z2 z3	1	-7,56	I(1)
Log(DE_IMEQ95)	C, trend, z1 z2 z3, s9101	1-4	-2,91	C, z1 z2 z3	1-3	-3,19	I(1)
Log(DE_INRB95)	C, trend, z1 z2 z3, s9101	1-3	-0,75	C, z1 z2 z3, i9101	1-3	-4,43	I(1)
Log(DE_INTPAGOV)	C, trend, z1 z2 z3	1-3	-2,84	C, z1 z2 z3	1,2	-10,81	I(1)
Log(DE_IOTH95)	C, trend, z1 z2 z3	1-8	-2,94	C, z1 z2 z3	1-7	-1,74	I(1)****
Log(DE_M95)	C, trend, z1 z2 z3, s9101, s9101*trend	1-4	-2,87	C, z1 z2 z3	1-6	-3,90	I(1)
DE_LOG_S	C, trend, z1 z2 z3, s9101*trend	1-4	-2,06	C, z1 z2 z3	1-3	-5,25	I(1)
Log(DE_NWAGE)	C, trend, z1 z2 z3, s9101	1-8	-1,54	C, z1 z2 z3, i9101	1-5	-4,39	I(1)
Log(DE_NYPRO)	C, trend, z1 z2 z3	-	-3,46***	z1 z2 z3	-	-10,1	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
** Significant at 5% rejection level of the Dickey-Fuller Tests statistics
*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics
**** Due to the changing seasonal pattern series show properties of I(2) process.

Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(DE_PC)	C, trend, z1 z2 z3,	1-6	-2,55	C, z1 z2 z3	1-5	-2,73	Trendstationary
Log(DE_PGDP)	C, trend, z1 z2 z3	1-4	-1,29	C, z1 z2 z3	1,2	-6,96	I(1)
Log(DE_PM)	C, z1 z2 z3	1-5	-2,53	z1 z2 z3	1-4	-4,77	I(1)
Log(DE_PRODHET)	C, trend, z1 z2 z3, s9101	1-5	-2,15	C, z1 z2 z3	1-3	-4,88	I(1)
Log(DE_PRODHWEE)	C, trend, z1 z2 z3, s9101	1	-3,17	C, z1 z2 z3	-	-15,07	I(1)
Log(DE_RAW_EWU)	C, z1 z2 z3	1-2	-2,20	z1 z2 z3	1	-4,90	I(1)

Log(DE_RAW_UK)	C, z1 z2 z3	1	-2,21	C, z1 z2 z3, i9101	1-3	-4,46	I(1)
Log(DE_RAW_US)	C, z1 z2 z3	1	-2,02	z1 z2 z3	-	-6,94	I(1)
Log(DE_REVGOV)	C, trend, z1 z2 z3	1	-2,83	C, z1 z2 z3	-	-7,34	I(1)
Log(DE_REVYTRF)	C, trend, z1 z2 z3, s9101	-	-3,14**	-	-	-	Trendstationary

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*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics

Sample 1980/91:1 – 2003:4	**Niveau**			**First Differences**			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
DE_RL5Y	C	1	-1,58	-	-	-6,79*	I(1)
DE_RS3M	C	1-6	-2,60	-	1-8	-2,42**	I(1)
Log(DE_SALESSUB)	C, trend, z1 z2 z3	1-3	-6,09*	-	-	-	Trendstationary
DE_SPREAD	C	1	-3,31	-	-	-	I(0)
Log(DE_SUBGOV)	C, trend	1-4	-0,97	C	1-6	-3,17	I(1)
Log(DE_T)	C, trend, z1 z2 z3	1,2	-1,31	C, z1,z2,z3	1	-4,74	I(1)
Log(DE_TDIR)	C, trend, z1 z2 z3	-	-2,53	C, z1,z2,z3	-	-6,02	I(1)
Log(DE_TDIREE)	C, trend, z1 z2 z3, s9101	1-6	-1,63	C, z1,z2,z3	1-5	-5,27	I(1)
Log(TDIREM1)	C, z1 z2 z3	-	-1,86	C, z1,z2,z3	-	-6,42	I(1)
Log(DE_TIND)	C, trend, z1 z2 z3	1	-2,64	C, z1,z2,z3	-	-13,22	I(1)
Log(DE_TRFGOV)	C, trend, z1 z2 z3	1-7	-1,91	C, z1,z2,z3	1,2	-2,74***	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
** Significant at 5% rejection level of the Dickey-Fuller Tests statistics
*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics
**** Rejects the hypothesis of $\gamma = 0$ under normal distribution. See Enders (1995), p. 257

Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(TRSONGOV)	C, trend, z1 z2 z3	1-8	-1,72	C, z1,z2,z3	1-7	-3,17	I(1)
Log(DE_TSS)	C, trend, z1 z2 z3	1-3	-3,11	z1,z2,z3	1-5	-2,74	I(1)
Log(DE_TSSEE)	C, trend, z1 z2 z3, s9101	1-3	-0,83	C, z1,z2,z3	1-3	-3,24	I(1)
Log(DE_TSEE_TARIFFSA)	C, trend, z1 z2 z3, s9101, trend*s9101	-	-1,99	C, z1,z2,z3	1-2	-7,20	I(1)
Log(DE_TSSEM)	C, trend, z1 z2 z3	1-3	-2,83	C, z1,z2,z3	1-5	-1,53	I(2)
Log(DE_TSSEM1)	C, trend, z1 z2 z3, s9101	1-7	-0,61	C, z1,z2,z3	1-3	-3,04	I(1)
Log(DE_U)	C, trend, z1 z2 z3, s9101, trend*s9101	1-7	-2,97	C, z1,z2,z3	1-3	-2,93	I(1)
Log(DE_ULC)	C, trend, z1 z2 z3, s9101	1-4	-2,34	C, z1,z2,z3	1-4	-2,92	I(1)
Log(DE_WDYENT)	C, trend, z1 z2 z3	-	-2,92	C, z1,z2,z3	1	-7,44	I(1)
Log(DE_X95)	C, trend, z1 z2 z3, s9101	-	-2,75	C, z1,z2,z3	-	-10,60	I(1)
Log(DE_XG95)	C, trend, z1 z2 z3, s9101	1-4	-3,41	C, z1,z2,z3	-	-11,09	I(1)

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Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(DE_XG95_EWU)	C, trend, z1 z2 z3, s9101	-	-2,53	C, z1,z2,z3	-	-9,7	I(1)
Log(DE_XG95_ROW)	C, trend, z1 z2 z3	-	-2,94	C, z1,z2,z3	-	-10,82	I(1)
Log(DE_XG95_UK)	C, trend, z1 z2 z3	1	-1,86	C, z1,z2,z3	-	-12,59	I(1)
Log(DE_XG95_US)	C, trend, z1 z2 z3	1,2	-1,89	C, z1,z2,z3	-	-11,11	I(1)
Log(DE_XS95)	C, trend, z1 z2 z3, i9101	-	-0,97	C, z1,z2,z3	1	-9,13	I(1)
Log(DE_Y)	C, trend, z1 z2 z3, s9101	1-8	-0,8	C, z1,z2,z3	1-3	-3,09	I(1)
Log(DE_YPROGOV)	C, trend, z1 z2 z3	1-8	-2,17	C, z1,z2,z3	1,2	-10,3	I(1)
Log(UK_GDP95)	C, trend, z1 z2 z3	1-3	-2,60	C, z1,z2,z3	1-7	-2,93	I(1)
Log(UK_IFC95)	C, trend, z1 z2 z3	1-4	-2,78	C, z1,z2,z3	1-7	-3,43	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
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*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics
**** Rejects the hypothesis of $\gamma = 0$ under normal distribution. See Enders (1995), p. 257

Sample 1980/91:1 – 2003:4	Niveau			First Differences			
Variables	**Specification**	**Lags**	**Teststatistik**	**Specification**	**Lags**	**Teststatistik**	**Order of Integration**
Log(US_IFC95)	C, trend	1-8	-2,42	C	-	-7,49	I(1)
US_RL10Y	C	1-7	-1,51	-	1-4	-6,04	I(1)
US_RS3M	C	1-7	-1,17	-	1-6	-4,04	I(1)
US_SPREAD	C	1-7	-2,64	-	-	-7,81	I(1)

* Significant at 1% rejection level of the Dickey-Fuller Tests statistics
** Significant at 5% rejection level of the Dickey-Fuller Tests statistics
*** Significant at 10% rejection level of the Dickey-Fuller Tests statistics

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